EXTRA! Book-Length Feature!

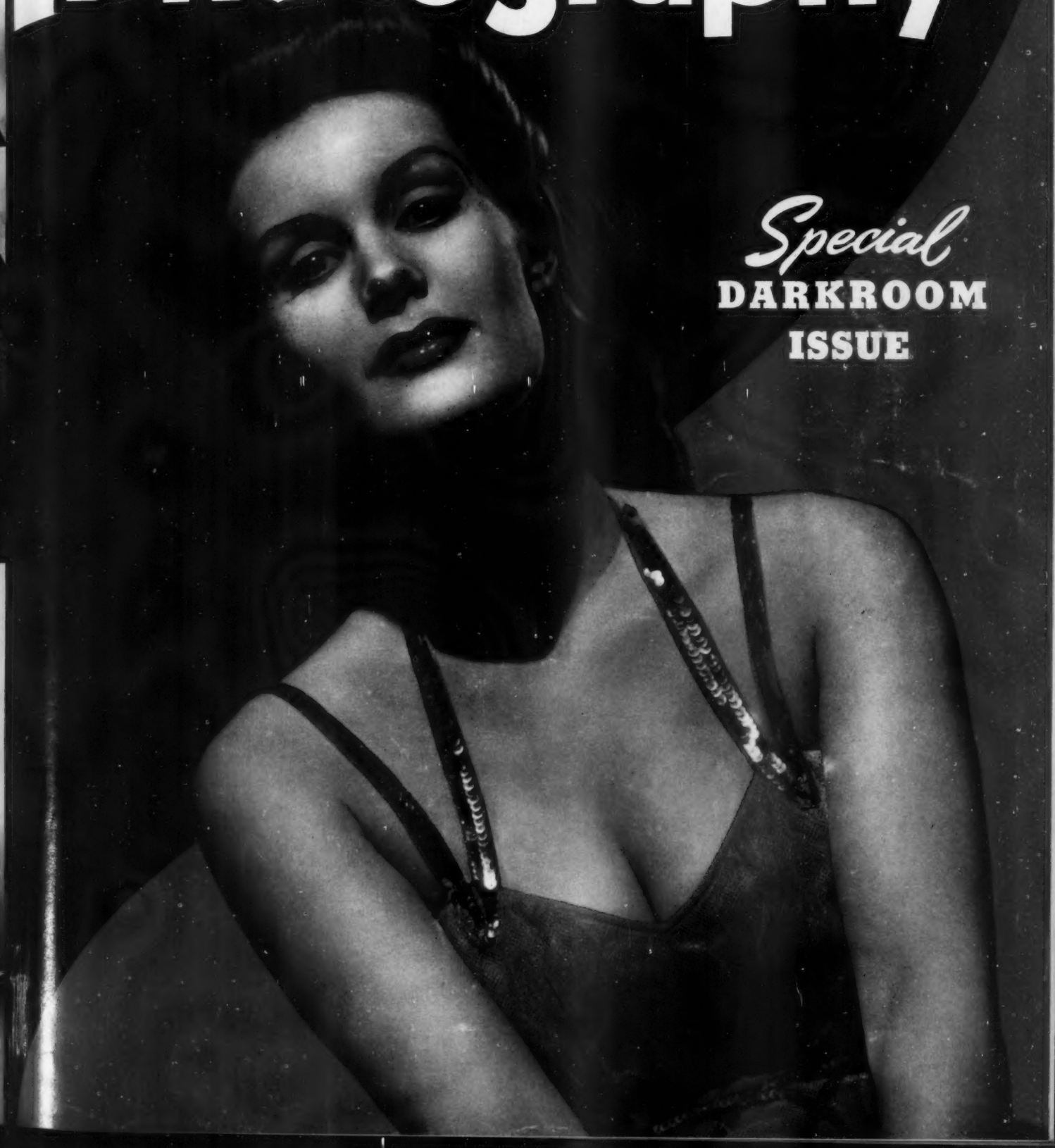
"HOME-BUILT PHOTO EQUIPMENT"

STACK 5

A POPULAR PHOTOGRAPHY DIVIDEND

POPULAR

# Photography



Special DARKROOM ISSUE

# Control

ONE of the great advantages of Agfa Ansco Cykora Paper is the *control of tone values* that it permits through selection of developers.

For this reason, and because of the striking results possible with its long-scale gradation, Cykora is often used for salon exhibits and for fine portraits. You'll like its inherent warmth, wide latitude and clean-working qualities.

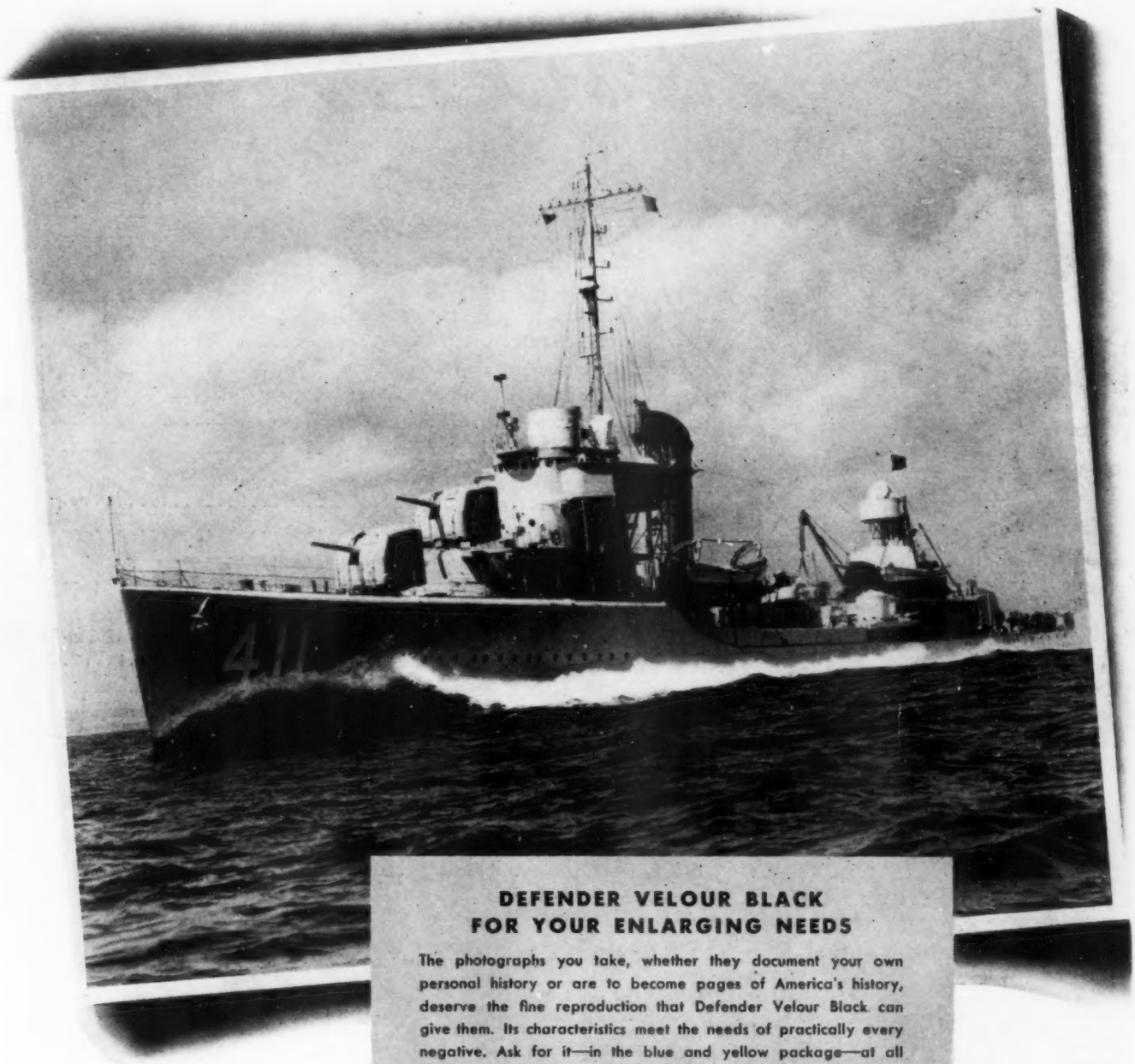
Take out some of your best negatives soon and try projecting them on Cykora. If you like to work with toners, Cykora gives excellent results with many of the standard formulas. **Agfa Ansco, Binghamton, New York.**

**Agfa Ansco**
**CYKORA PAPER**
**MADE IN U.S.A.**
**A Century of Service to American Photography**

# *Photography-mirror to America's might*

In the Red River Valley, in Tucson and Denver and Butte, throughout all of the United States, Americans know their Navy. They know the clean sweep of the open sea, they thrill to the deadly sleekness of the sharp-prowed destroyer knifing through the waves. In the magic of photography they ride with the convoys, they see the flash of guns, the white geysers of exploding depth charges. Photography keeps all America on the firing line.

Photography is in action every day, in documenting America's war efforts, in aerial reconnaissance, mapping, intelligence work, record keeping and as an aid to war production. Photography is helping to write the terms of victory.



OFFICIAL U. S. NAVY PHOTOGRAPH

**DEFENDER VELOUR BLACK FOR YOUR ENLARGING NEEDS**

The photographs you take, whether they document your own personal history or are to become pages of America's history, deserve the fine reproduction that Defender Velour Black can give them. Its characteristics meet the needs of practically every negative. Ask for it—in the blue and yellow package—at all Defender dealers.

DEFENDER PHOTO SUPPLY CO., INC., ROCHESTER, NEW YORK

*Defender*

OCTOBER
1942

# POPULAR Photography

Trademark Registered

Including AMATEUR CINEMATOGRAPHY

Combined with PRIZE PHOTOGRAPHY Magazine, formerly EVERYDAY PHOTOGRAPHY

★

VOLUME 11
NUMBER 4

# contents

How were those amazing shots of bombed Germany made? Group Capt. Laws, R.A.F. Deputy Director of Photography, tells in the big November issue.

★

EDITORIAL AND ADVERTISING OFFICES: 540 No. Michigan Ave., Chicago, Ill. New York Office, 270 Madison Ave., New York City; Western Advertising Office, 416 W. Eighth St., Los Angeles, Calif.; Washington Bureau, Lt. Col. Harold E. Hartney, Mgr., Occidental Hotel, Washington, D. C.

William B. Ziff, Publisher; B. G. Davis, Editor

Managing Editor, Andrew B. Hecht, Ph. D.
Assistant Editors:
Frank Fenner, Jr., Robert L. McIntyre
Art Director, Herman R. Bollin
Circulation Manager, H. G. Strong

CONTRIBUTIONS: Contributors are advised to retain a copy of their manuscripts and illustrations. Contributions must be accompanied by return postage and they will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Any copy accepted is subject to whatever adaptations and revisions are necessary to meet the requirements of this publication. Payment covers all author's, contributor's, and contestant's rights, title, and interest in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of material purchased.

POPULAR PHOTOGRAPHY is published monthly by the Ziff-Davis Publishing Company at 540 N. Michigan Ave., Chicago, Ill. Entered as second-class matter July 30, 1937, at the Post Office, Chicago, Ill., under the act of March 3, 1879. Entered as second class matter at the Post Office Department, Ottawa, Canada.

SUBSCRIPTION RATES: In U. S., $3.00 per year, single copies 25 cents; in South and Central America and U. S. Possessions, $3.00 per year; in Canada, $3.00 per year, single copies 30 cents; in British Empire, $3.75 per year; all other foreign countries, $6.00 per year. Subscribers should allow at least two weeks for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 540 N. Michigan Ave., Chicago, Ill.

Member of the Audit Bureau of Circulations.

**Cover by Paul Garrison. See Page 72.**

PICTURE OF THE MONTH, Edward L. Hayes ..... 19
Seeing the War—In Tabletops ..... 20
Fellowships for Photographers ..... 22
Model Darkroom Has Everything ..... 24
The Truth About Wetting Agents ..... 26
Making Murals in Any Darkroom ..... 27
Seven Methods of Correcting Your Negatives ..... 28
Save That Print! ..... 30
See Your Films Develop ..... 33
More Film Speed ..... 34
Stains and How to Prevent Them ..... 35
Picturing Thoughts ..... 36
Dogbody's Darkroom ..... 38
Movie Tilting with Positive Film ..... 51
Darkroom Kinks ..... 52
Copying with the Enlarger ..... 54
Filming Milk . . . From Cow to Kitchen ..... 57
Amateur Movie Making ..... 62

**Popular Photography Dividend**

Home-Built Photo Equipment, by Walter E. Burton ..... 103

Press Flashes ..... 10
Candid Shots by the Editor ..... 16
Questions and Answers ..... 18
Letters to the Editor ..... 18
Mirror Aids Copying ..... 32
Pictures from Our Readers ..... 56
Trade Notes and News ..... 58
Calendar of Photographic Exhibits ..... 58
Money Making Ideas ..... 60
New Home Movies ..... 64
Print Criticisms ..... 67
What the Camera Clubs Are Doing ..... 70
Popular Photography Traveling Salons ..... 71
Notes on the Salon Section ..... 72
Tabletop Silhouettes ..... 74
Contests and Markets ..... 77

## Salon Section

S. O. S. by Leslie Aylor ..... 39
FISHERMEN by Alex J. Cattanach; Carola Gregor ..... 40
CONVOY by Larry Williams ..... 41
STILL LIFE by Leslie L. Johnson; Henry Inn ..... 42
MECHANICS by H. Armstrong Roberts; Howard Hoadley ..... 43
CLOUDS by H. V. Lyle ..... 44
STUDY by Paul Heismann ..... 46
READY by Zia Qadri; Frank Ubhaus ..... 47
SMOKE by George M. Johnson; Newton Hartman ..... 48
FIRST AID by H. Armstrong Roberts ..... 49
SEA FOAM by Fritz Henle ..... 50

Copyright, 1942
ZIFF-DAVIS PUBLISHING COMPANY

NOW! OWN CASTLE FILMS'

# ASTOUNDING WAR MOVIE!

FOR ALL 8MM. and 16MM. PROJECTORS

# "FIGHT for EGYPT"

COSTS LESS THAN UNEXPOSED FILM!

TERRIFIC BATTLE SCENES FILMED IN STARTLING CLOSE-UP UNDER LAND, SEA and SKY FIRE!

SEE the mighty struggle for possession of Alexandria and Suez! Actual battle scenes filmed under fire by death-defying cameramen! See the surging tide of battle as the forces of Rommel and Auchinleck lock in a fight to the finish! See war in all its fury! Shells bursting! Tanks and planes exploding! Men attacking and counter-attacking! Close-up shots of dive bombers attacking convoy! Night and day battling on land, sea, and in the air! War pictures like these have never been filmed before! An astounding movie record that is a *must* for every projector owner! Own it now!

*All Castle 16 mm. films are Vap-O-Rated. All Castle 8 mm. films are also treated.*

YOU CAN OWN A COMPLETE RECORD OF THE WAR IN CASTLE FILMS!

*Here are a few of the latest historic films:*

**"MIDWAY AND CORAL SEA BATTLES"**—Actual scenes of the two mightiest sea-air battles to date! U.S.S. *Lexington's* dramatic end!

**"MacARTHUR, AMERICA'S FIRST SOLDIER, and BOMBING OF MANILA"** (both in one film)—Career of America's first soldier, and tragedy in Manila.

**"BOMBING OF PEARL HARBOR and BURNING OF S.S. NORMANDIE"** (both in one film)—Sneak Jap attack on our great naval base, and loss of world's largest liner.

**"BRITISH COMMANDOS IN ACTION"**—Fierce raid on Nazi strongholds! Amazing fighting scenes!

**"RUSSIA STOPS HITLER"**—Soviet's heroic stand against Nazi might! Thrilling battle scenes!

Send for FREE catalogue describing all Castle War Films!

ON SALE NOW AT YOUR PHOTO DEALER! PHONE, WRITE, CALL OR SEND HIM THIS HANDY ORDER FORM TODAY!

CASTLE FILMS INC.

RCA BLDG. NEW YORK — FIELD BLDG. CHICAGO — RUSS BLDG. SAN FRANCISCO

Send Castle Films' "Fight for Egypt" in the size and length checked.

| 50 ft. 8 mm. | 100 ft. 8 mm. |
|---|---|
| $1.75 ☐ | $5.50 ☐ |
| 100 ft. 16 mm. | 200 ft. 16 mm. | 350 ft. 16 mm. |
| $2.75 ☐ | $8.75 ☐ | $17.50 ☐ (SOUND) |

Remittance enclosed ☐ Ship C. O. D. ☐ Send Castle Films' FREE Catalogue ☐

*Name*_____

*Address*_____

*City*_____

*State*_____ PP-10

# IN NEW YORK IT'S PENN!

Camera fans the country over look to PENN for help and advice when photographic problems arise. If the dark room is still a mystery to you, you are missing a lot of fun! Consult PENN experts, without cost or obligation.

## REPLENISH YOUR DARKROOM

**Selected Items From Our Accessory Catalogue**

| | |
|---|---|
| Kodak Home Print Washer | $ 5.85 |
| Photrix Print Washer | 3.29 |
| Eastman Tray Siphon | 4.49 |
| F. R. Special Adj. Roll Film Tank | 2.65 |
| F. R. Adjustable Cut Film Tank | 7.65 |
| Pennex Tank and Tray Thermometer | .49 |
| Agfa Safelight Outfit with 3 Filters | 1.84 |
| F. R. Adjusto Print Press | 4.46 |
| Precise 10″ Trimming Board | 3.29 |
| Luxor No. 2 Photo Timer | 3.15 |
| Eastman Studio Scale | 3.85 |
| Pennex No. 188 Spotlight | 1.39 |
| F. R. Highspot | 11.95 |
| Pennex clamp-on 11½″ Reflector for No. 2 flood | 2.19 |

## ENLARGERS

Penn Features a Complete Stock of All Outstanding Enlargers—Buy Now While Stocks are Complete.

## USED ENLARGER SPECIALS

| | |
|---|---|
| Zeiss Mirax enlarging attachment | $16.50 |
| Leica Valoy enlarger, latest, 35 mm | 37.50 |
| Simmon Omega A, latest, 35 mm | 39.50 |
| Simmon Omega B, latest, 2¼ x 2¼ | 44.50 |
| Vertex 2¼ x 2¼, F4.5 lens | 19.95 |
| Praxidos 2¼ x 2¼, F4.5 lens | 24.50 |
| Elwood AM, 2¼ x 3¼, F4.5 Wollensak lens | 29.95 |
| Bee Bee 3¼ x 3¼, F4.5 lens | 44.50 |
| Solar Model IV, F6.3 Wollensak 3¼x4¼ | 49.50 |

## MOVIE SPECIALS

Zeiss 16 mm. Movikon, F1.4 Biotar lens—Case—and three filters.
Close working attachment and Focusing Magnifier ..... $345.00

Sonnar 75 mm. F4, Telephoto for Movikon ..... $105.00

## SELECTED USED CAMERA SPECIALS

| | |
|---|---|
| Foth Derby ½ V.P., F3.5 lens | $15.95 |
| Perfex 55, F3.5 Wollensak lens | 42.50 |
| Zeiss Tenax I, F3.5 Novar lens | 59.50 |
| Zeiss Tenax II, F2 Sonnar lens | 139.50 |
| Robot I, F2.8 Tessar lens | 89.50 |
| Retina I, chrome, F3.5 Ektar lens | 47.50 |
| Leica G, F2 Summar lens, E. R. Case | 159.50 |
| Contax I, F2 Sonnar lens, E. R. Case | 119.50 |
| Contax II, F2 Sonnar lens, E. R. Case | 179.50 |
| Contaflex, F2 Sonnar lens, E. R. Case | 195.00 |
| Weltini, F2 Xenon lens | 89.50 |
| Super Dollina, F2 Xenon lens | 89.50 |
| Super Ikonta B, F2.8 Tessar lens, E. R. Case, latest model | 159.50 |
| Rolleiflex Automat, E. R. Case | 199.50 |
| Exakta Jr. chrome, F3.5 Exaktar lens | 64.50 |
| Exakta Model B, Tessar F2.8 lens | 119.50 |
| R. B. Graflex Series B, 2¼ x 3¼ | 79.50 |
| 6 x 9 Bee Bee, F2.9 Trioplan lens | 69.50 |
| 6 x 9 Voigtlander Bergheil, F3.5 Heliar lens | 89.50 |
| Korrelle II, Tessar F2.8 | 139.50 |

## CONTAX AND LEICA ACCESSORIES

| | |
|---|---|
| Leitz 28 mm. F6.3 Hektor wide angle | $79.50 |
| Leitz 90 mm. F4 Elmar telephoto | 87.50 |
| Leitz 135 mm. Hektor F4.5 telephoto | 109.00 |
| Leitz 73 mm. Hektor F1.9 telephoto | 109.00 |
| Leitz 90 mm. Thambar, F2.2 telephoto | 109.00 |
| Leitz Vidom Finder, chrome | 47.50 |
| Contax Biogon 35 mm., F2.8 | 149.50 |
| Hugo Meyer F2.8, 105 mm. telephoto lens for Contax | $89.50 |
| Contax Sonnar 135 mm., F4 telephoto | 120.00 |
| Zeiss Contameter for Contax II | 57.50 |
| Zeiss Revolving View Finder | 57.50 |

## New KODAK EKTAR LENS for the EKTRA CAMERA

| | |
|---|---|
| 35 mm. F3.3 wide angle | $72.50 |
| 50 mm. F1.9 | 133.50 |
| 90 mm. F3.5 | 90.75 |
| 135 mm. F3.8 | 138.75 |
| Zeiss 9 x 12 Favorita, F4.5, 6″ Tessar | 89.50 |
| Kodak Recomar, 9 x 12, F4.5 K. A | 59.50 |
| Miniature Speed Graphic, F4.5 Tessar, Kalart range finder, Abbey Synchronizer | 129.50 |
| Graflex Series D, 3¼x4¼, F4.5 Tessar | 129.50 |
| Graflex Series D, 3¼x4¼, F4.5 Skopar | 109.50 |

## Cash for Your Old Equipment

We pay highest cash prices for used equipment. Send it to us, postage collect, for appraisal. If you are not satisfied with our offer, we will either return it immediately, postage prepaid, or, if you prefer, we will keep it on consignment for 30 days and try to find a purchaser who will meet your demands. In either case, you risk nothing.

## CASTLE FILMS

*"Fight for Egypt"*

**Terrific battle scenes, filmed under fire, on land and sea and in the air.**

**The most thrilling pictures yet to come out of World War II.**

FAMOUS FOR FAIRNESS

# Penn

CAMERA EXCHANGE inc.

126 West 32nd St., N. Y. C. • LA 4-8715

Michael Barbero
Official Photographer
Ewing Galloway Service
*Who TRIPLED His Income Through N. Y. I. Training*

# "N. Y. I. TRAINING QUALIFIED ME FOR SUCCESS IN PHOTOGRAPHY"

by Michael Barbero

"I AM deeply and sincerely grateful to New York Institute of Photography for the training it gave me. Not only did this qualify me for success in photography, but, even more important, I enjoy every minute of my work. One of the greatest advantages of N.Y.I. training is the complete knowledge you gain of technical details and the many secrets of photography—knowledge that is difficult, almost impossible to gain in the hard 'school of experience'.

"I unconditionally recommend New York Institute of Photography to any man or woman interested in mastering the art of photography, whether for fun or as a profession."

***LET THE SUCCESS OF FAMOUS N. Y. I. TRAINED PHOTOGRAPHERS SHOW YOU THE WAY***

Only N.Y.I.—oldest, largest school of its kind—offers you the special unique PHOTO-PERSONALIZED training by outstanding experts, which helped Michael Barbero and scores of other top-notch photographers win success. Enroll NOW. Learn SUCCESSFUL photography under full-time instructors, always present to guide and encourage your progress.

***Enroll NOW—Come to New York or Study at Home!***

Start NOW! No classes! Study in our beautiful New York Studios or by correspondence at home, under individual guidance. Commercial, advertising, news, fashion, industrial, portrait, motion picture and color photography. Never so many well-paid opportunities in photography as today. Write NOW for free illustrated booklet just off the press.

*Photographs by Michael Barbero for Ewing Galloway*

***WARTIME OPPORTUNITIES***
**Trained photographers are finding new opportunities every day in production industries, Civilian Defense Activities, etc. In military service, too, photographers are getting preferred ratings, "non-com" and petty officer appointments and increased pay. These and many other demands for photographers created by America's wartime needs have put N. Y. I.'s FREE Employment Bureau 32% ahead of last year!**

***WOMEN WINNING PHOTOGRAPHIC SUCCESS EVERYWHERE***
**Photography is today's ideal career for women—as proved by the success of hundreds! Women excel in portrait, child, fashion, food, laboratory and scientific photography. In this fascinating field opportunities for the trained woman expert are greater today than ever before.**

**NEW YORK INSTITUTE OF PHOTOGRAPHY**

**Dept. 99 10 West 33 Street New York, N. Y.**

**MAIL THE COUPON TODAY**
**FOR BEAUTIFUL ILLUSTRATED BOOK**

**NEW YORK INSTITUTE OF PHOTOGRAPHY**
**Dept. 99, 10 W. 33 St., New York City**

Gentlemen:
Please send me your new FREE catalog. It is understood that no salesman will call.

Name .....
Address .....
City ..... State .....

WRITE FOR Free CATALOG

TYPICAL Peerless VALUES

# Special Sale on Complete Darkrooms

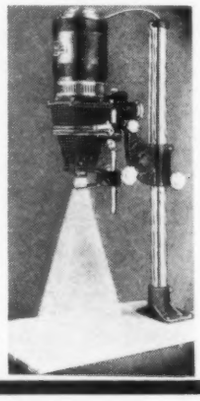
**Solar II Enlarger,** 3½" f4.5 Wollensak Enlarging lens, 2¼x3¼, condenser lighting system, glassless negative carrier. Three 8x10 Enamel Trays. 11x14 Albert Viceroy Adjustable Easel. Marsell 5x7 Safelight with Red and Yellow Slides, Luxor Minute and Second Darkroom Timer. 8x10 Blotter Book, interleaved with wax paper.
**List price . . $79.50. Our price . $69.50**

**Federal 219 Enlarger** with f6.3 lens, accommodates negatives up to 2¼x3¼. 11x14 Adjustable Enlarging Easel. Albert Safelight with red and yellow slides. Three 8x10 Glassteel Trays. One package of Blotters. One 4" Roller. One 7" Trimmer with Self Sharpening Blade.
**List price . . $37.00**
**Our price $31.50**

**4x5 Albert Adjustable** Contact Printer with built-in Safelight. Three 5x7 Hard Rubber Trays. 10x14 Ferrotype Plate. 6" Roller. Package of 8x10 Blotters. Pract-O-Lite Safelight Lamp with two Slides, red and amber. Set of Plastic Print Tongs. Stirring Rod Thermometer.
**List price . . . . . $18.50**
**Our price . . . . . $12.50**

**Praxidos 4x4cm Enlarger** for 35mm to 4x4cm film with f4.5 Laack Enlarging Anastigmat lens, double condensers. Set of Enlarging Easels, 3½x5 to 8x10. B & W Safelight Lamp. Three 8x10 Glassteel Trays. Package of twenty-four Blotters.
**List price $27.50**
**Our price . . . . . $23.50**

**DeJur Versatile I,** with the 3½" f4.5 Ilex Paragon Anastigmat Enlarging lens, aeroteck ventilation, double condensers, interchangeable lensboard, distortion control and extra long bellows. It accommodates negatives from 35mm to 3¼x3¼. Albert Automatic 11x14 Enlarging Easel. Albert four way Safelight lamp —Table Model complete with Stand and Three Safelight Slides and one White Slide. Lee Electric Timer, accurately times up to 75 seconds and automatically turns off safelight when exposure is made. 12" P B I Trimmer with Self Sharpening Blade. Roto Dryer, deluxe Model which accommodates three 11 x 14 prints or equivalent, with built-in Squeegee. Kemp Print Washer, completely washes prints in shortest possible time. 32 Ounce Glass Graduate. Plastic Stirring Rod. Set of Plastic Print Tongs, red and black. Glass Funnel.
**List price . . . . . $170.00**
**Our price $145.00**



### MOVIE EQUIPMENT

| | |
|---|---|
| BOLEX H-8, f2.7 Wollensak, excellent | $179.50 |
| UNIVEX 8, f4.5 lens, excellent | 6.50 |
| UNIVEX 8, f5.6 lens, excellent | 5.00 |
| KEYSTONE K8, f3.5 Wollensak, like new | 19.95 |
| REVERE 88, f3.5 Wollensak, new | 34.95 |
| REVERE 88, f2.5 Wollensak, new | 49.95 |
| REVERE 99 Turret, f2.5 Wollensak, new | 73.50 |
| MAG. CINE PERFEX, f2.5 Woll., case, l. n. | 45.50 |
| REVERE 80, 500 Watt Projector, new | 69.95 |
| CINE KODAK Model E, f3.5, 3 speeds, l. n. | 32.50 |
| BOLEX H-16, f2.7 Wollensak, excellent | 179.50 |
| B&H AUTOMASTER Turret, 1" f2.7 T.H.C., 15mm f2.7 W.A., 3" f3.5 Tele., new | 248.00 |
| B&H AUTOLOAD SPEEDSTER, f2.7, like new. | 85.00 |
| KEYSTONE A7, f2.7 Wollensak, like new | 29.50 |
| KEYSTONE B-16, f3.5 Ilex, like new | 19.50 |
| KEYSTONE A3, f3.5 Wollensak, case | 23.50 |

**EVERYTHING SOLD WITH A MONEYBACK GUARANTEE**

### CAMERAS

| | |
|---|---|
| LEICA III B, f2 Summar, case, like new | $205.00 |
| LEICA G, f2 Summar, case, like new | 159.00 |
| LEICA D, f2 Summar, coupled, like new | 125.00 |
| 73mm f1.9 LEITZ Hektor Telephoto, like new | 89.00 |
| CONTAX III, f1.5 Sonnar, case, like new | 229.00 |
| TENAX II, f2.8 Tessar, case, new | 117.00 |
| PRAKTIFLEX, 35mm reflex, f3.5 Xenar, new | 85.00 |
| KINE EXAKTA, 35mm reflex, f2 Xenon, 85mm f4 Triotar, 250mm f6.3 Tele Tessar, sunshade, case, like new | 475.00 |
| ARGUS C3, f3.5, coupled, flash, case, like new | 31.50 |
| ARGUS C2, f3.5 lens, coupled, like new | 21.95 |
| ARGUS CC, f4, photo electric meter, like new | 22.50 |
| PERFEX 22, f3.5 Scienar, coupled, like new | 27.50 |
| PERFEX 55, f3.5 Wollensak, cpld., case, l. n. | 41.50 |
| DOLLINA III, f2.9 Schneider, cpld., like new | 69.00 |
| 35mm WIRGIN, f4.5, case, excellent | 17.50 |
| ARGOFLEX, reflex, f4.5, case, like new | 29.50 |
| VOIGT. BRILLIANT, f4.5 Skopar, case, excell. | 27.50 |
| SUPER IKONTA A Special, f3.5 Tessar, cpld. | 109.00 |
| VOIGT. BESSA, f3.5 Skopar, coupled, like new | 79.50 |
| WELTUR, f2.9 Cassar, coupled, new | 98.50 |
| MINI. SPEED GRAPHIC, f4.5 lens, coupled Kalart r.f., Abbey Gun, like new | 149.00 |
| 9x12 BERGHEIL, f4.5 Heliar, Kalart flash gun, like new | 69.00 |

### MISCELLANEOUS

| | |
|---|---|
| DeLuxe SLIDE BINDING KIT for 2x2 Slides, consists of Albert Bakelite Slide File, 100 capacity, complete with Index, package of 100 cover glass, package 100 masks, Slide Binding Vise, roll of Scotch Cellulose Tape. Total Value $7.00 | $ 4.98 |
| ENAMEL DEV. TRAYS, 5x7—66c each, 8x10—79c each, 11x14—each | 1.35 |
| ALBUMS, 8½x11, Bellows Type | 1.25 |
| KODAK ALL METAL PRINTER, 4x5 size | 13.50 |
| WEACO ROTO CHROMIUM DRUM DRYER, Standard Model dries 2—11x14 prints | 9.95 |
| DeLuxe Model dries 2—11x14 prints | 14.95 |
| Professional Model dries 4—11x14 prints | 19.95 |
| 11x14 ADJUSTABLE Enlarging Easel | 3.95 |
| 11x14 ALBERT AUTOMATIC Enlarging Easel | 9.25 |
| ARGUS SLIDE PROJECTOR, 2x2, like new | 16.50 |
| TRIPOD, all steel, lightweight, new | 1.19 |

**TRADE OR SELL YOUR OLD EQUIPMENT**

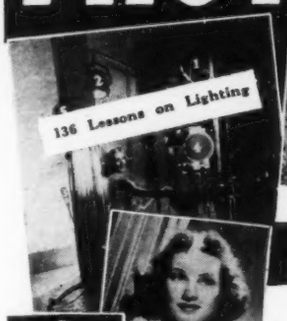
# PEERLESS
## CAMERA STORES
**128 EAST 44th STREET • NEW YORK, N. Y.**
**Phone MUrray Hill 3-7288**

# Camera Fans! Here's the BIGGEST NEWS of the Year!

## The National Educational Alliance

## Now Brings You This Amazing, COMPLETE

# PHOTOGRAPHIC COURSE!



Child Photography simply explained by experts

How range finders and other devices work—shown in diagrams

## Over 1000 Fascinating Lessons

**Prepared by Over 200 Famous Experts — including WILLARD D. MORGAN of Leica fame — WALT DISNEY —MARGARET BOURKE-WHITE of Life — and Dozens of other top-notch Professionals!**

**AT LESS THAN 1¢ for EACH Illustrated LESSON!**

IN RESPONSE to insistent demand, the NATIONAL EDUCATIONAL ALLIANCE has obtained the services of the most distinguished faculty of photographic experts ever to cooperate in a course, including ranking specialists in the Kodak, General Electric, Bell & Howell and other world-famous research laboratories! The Alliance is investing hundreds of thousands of dollars to bring you the finest Complete Home Photographic Course ever offered! A single glance at some of the famous names on the N.E.A. Editorial Faculty of THE COMPLETE PHOTOGRAPHER will convince you of the practical, authoritative, up-to-the-minute character of these lessons. (See partial list at left.) *EVERY* field of photography is represented.

### You Get the Latest Techniques of Big Pay Experts

No longer need you search through dozens of magazines and books, in the hope of securing definite "how-to-do-it" directions for perfect results in Color work, in Movies, in Candid Camera and Theatre shots, in Portraits by artificial lighting, in Speed Sport pictures, and in many other fascinating specialties. No longer need you rely upon getting haphazard or hearsay information on the latest and best methods of Exposure, Development, Printing and Enlarging for superb pictorial results. For now over 200 famous experts bring you absolutely ***EVERYTHING*** you need to know for highest success in ***ALL*** amateur and professional photo fields!

### NEARLY 10,000 ILLUSTRATIONS

**—432 in "Deeptone" and Full Color!**

Each lesson group brings you Art Prints of extraordinary salon pictures and American and foreign prize winners. Nearly 10,000 pictures and diagrams are accompanied with practical data telling you how to produce perfect results in EVERY photographic process.

### You May Keep Your Copies of The Complete Photographer as a Reference Encyclopedia!

The editors of THE COMPLETE PHOTOGRAPHER do not expect that you will want to make use of all the valuable information offered in every group of lessons. Their aim is to provide such a wide and varied choice of photographic opportunities for pleasure and profit that every member will find all the units of instruction which he will ever want and need.

You can thus not only enjoy and profit from every issue of THE COMPLETE PHOTOGRAPHER while the lesson groups are coming, but you may preserve them as a permanent 55-volume library, providing a veritable encyclopedia of all the important photographic information in the world. For this purpose the ALLIANCE furnishes at trifling cost a special binder for every two months' issues.

### THE COMPLETE PHOTOGRAPHER Comes to You at Regular Intervals and It Bring You This Complete Course in Serial Form.

From 20 to 40 lessons in each issue, with a wealth of photographs and explanatory diagrams. The attached coupon brings you the first issue at the special introductory price of only 25c. Succeeding issues come to you on the 10th, 20th and last day of each month at 35c each, or 3 for $1.00. This most modern Photographic Course will be complete in about 18 months. **STOP WHEN YOU LIKE!** When you mail the coupon with only 25 cents, you do not agree to pay for the entire series of COMPLETE PHOTOGRAPHER Lesson-Groups. You can let them come to you as long as you please, and stop when you please. Mail the coupon TODAY! THE NATIONAL EDUCATIONAL ALLIANCE, Inc., Dept. 7110, 37 West 47th Street, N. Y.

Copyright by the National Educational Alliance, Inc.

### Just a Few "High Spots" from the 1000 LESSONS!

**LIGHTING**—Artificial Lighting for Indoors; Lighting for Portraits; Multiflash and Synchroflash Photography; etc.

**COLOR PHOTOGRAPHY**—Color Processes; Color for the News Photographer; Amateur Movies in Kodachrome; Separation Negatives; Color Printing, etc.

**FOR ADVANCED AMATEURS**—Bromoil Printing, Toning, Carbon and Carbro Printing; Copying; the Paper Negative; Developers; etc.

**CAREERS IN PHOTOGRAPHY** — Newspaper and magazine work, Criminology, Portraiture, Army Aerial Work, Studio Management, Advertising and Fashion Work. By Margaret Bourke-White, Ed Stanley, William Eckenburg, Arthur Brackman, John F. O'Reilly, etc.

**MOVIES**—8, 16 and 35 mm Silent, Sound and Color Motion Pictures; Professional and Amateur Work; Movies of Travel; Wild Life; Animated Cartoons; Sound Recordings; etc.

**DEVELOPING AND PRINTING**—Include Enlarging and Photographic Papers; Correcting Defects; Classes and Formulas for Developers; etc., etc.

**BEGINNERS' LESSONS**—ABCs of Still and Movie Photography; How Cameras Work; Color and Composition for Beginners; Choosing Equipment; Processing Made Easy; etc.

Literally **EVERYTHING** You Want to Know!

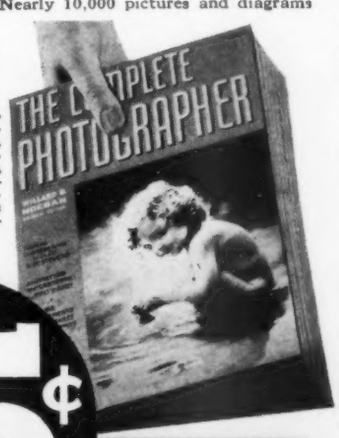
●

### 200 Experts Include:

TED ALLAN—Chief of Photography, Columbia Broadcasting System, Hollywood. WALTER CLARK—Ph. D., F.R.P.S.—Specialist in Photographic Research at Eastman Kodak Laboratories. ANSEL ADAMS—Photographer, Famous Author of Articles and Book, "Making a Photograph." JAMES WONG HOWE—Internationally Known Cinematographer. TORKEL KORLING—Specialist in Baby Pictures. DMITRI KESSEL—Expert Industrial Photographer. BRADFORD WASHBURN—Director of New England Museum of Nat. History. WILLIAM MORTENSEN—Internationally Famous Photographer, Writer, Teacher, and many others!

**General Editor, WILLARD D. MORGAN**

Writer, Photographer, Co-Publisher of the Leica Manual, Miniature Camera Work, Synchroflash Photography, Graphic Graflex Photography, etc.




## Only 25¢ to Start!

## And you can STOP ANYTIME!

*Without the Slightest Obligation to Continue!*

*Mail this Coupon with only 25c for your first COMPLETE PHOTOGRAPHER*

NATIONAL EDUCATIONAL ALLIANCE, INC.
37 West 47th Street, Dept. 7110, New York, N. Y.

For the enclosed Special Introductory Price of only 25c, please send me prepaid the first issue of THE COMPLETE PHOTOGRAPHER containing the first group of lectures on *Equipment; Composition of Pictures; Theory and Practice of Exposing, Developing, Printing Still, Color and Motion Pictures; Action Photography; Complete Survey of Photography's Opportunities*—and enroll me for eighteen months. You may send me THE COMPLETE PHOTOGRAPHER on the 10th, 20th, and last day of each month at the rate of 35c per issue or 3 issues for only $1, until I give you notice to cancel my enrollment. For convenience in bookkeeping, you may bill me once a month for such lectures as I receive.

*It is understood that I may cancel at any time and pay only for copies actually received.*

Mr.
Mrs.
Miss (PLEASE PRINT IN BLOCK LETTERS)

Address

City & State Please Indicate Your Age Here

# SPECIAL OFFER

## to owners of *KALART* SYNCHRONIZED RANGE FINDERS

To owners of Kalart Lens-Coupled Range Finders, Models "G," "K," and "F," Kalart offers a special individualized service.

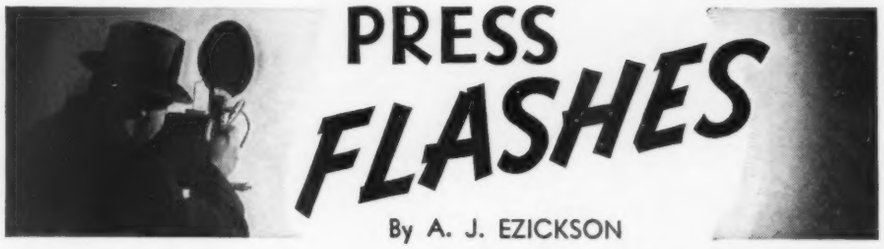
In this renewal service, competent factory technicians will clean, overhaul and reinstall your Kalart Range Finder; adjust and check focus. In addition, your present mirrors will be replaced with the new, gold-color mirrors which will give you a more brilliant image than you've ever had before.

This reconditioning service is offered at special low prices for a limited time only. For Model "G" the price is $6.50. For Model "K," $5. For Model "F," $4.50.

Take advantage of this unusual opportunity. Send your camera and Kalart Range Finder directly, or through your dealer, to our plant at Stamford, Conn., requesting this service. Your camera and Range Finder will be returned to you within seven working days after we receive your equipment. A special guarantee certificate will accompany it.

**THE KALART COMPANY INC.**
114 Manhattan Street
Stamford Box 710 Conn.

**BUY WAR BONDS**

# PRESS FLASHES

By A. J. EZICKSON

PICTURES still continue apace with the news—which should be of encouragement to the news photographer holding onto his job, and to the amateur who seeks financial reward from his prints. And that goes for features—strictly the Sunday roto or the daily filler stuff. Evidences of this are many. Some newspapers have given up the more costly rotogravure, but in turn are devoting picture space in black and white sections. The same number of pictures—if not more—are being used as they were before Pearl Harbor. The picture agencies are syndicating as many as ever before—because there is a demand for good pictures, both news and features.

True, a large amount of newspaper space is devoted to war pictures, and war background material—but unusual features are still going strong. Several potent evidences of this trend are to be found in the New York City area. The New York *Post*, since it adopted the tabloid form, is using more pictures than ever before. The New York *Journal-American* has added three daily picture pages as a regular feature. War or no war—pictures are here to stay.

• • •

PHOTOGRAPHERS covering the war, at home or abroad, are learning first hand how the members of our armed forces live. Tommy Burns and Gladwin Hill, *Wide World* photographer and reporter respectively, recently tried out the Army's concentrated pack rations while on desert maneuvers in Southern California with the First Armored Corps. Pvt. Howard Harsell whipped up a meal of meat and vegetables, crackers, coffee with sugar, and a square of fudge, over a sagebrush fire.

• • •

WITH a transmission time of only ten minutes, pictures can now be received by radio direct from Cairo, Egypt. Formerly, they were relayed via London. The first picture which marked the opening the other day by R.C.A. Communications, Inc., of the first direct service between Egypt and the United States showed King Farouk of Egypt and American Minister Alexander Kirk, photographed in the Royal Palace in Cairo.

• • •

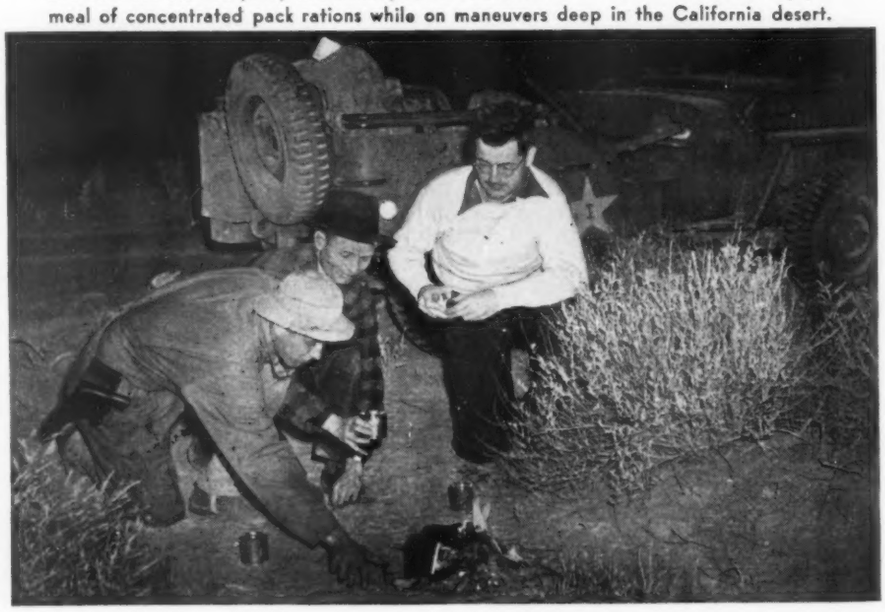
AMONG the WAAC's at Fort Des Moines, Iowa, is none other than Jackie Martin, one of the country's outstanding woman photographers. And she's there as the camp's official photographer. Jackie is always up there in front, copping some award or other, and breaking some time-honored precedent. Not so long ago, she was let into the ranks of the White House Photographers Association, which since its beginning has been an organization "for men only." The Royal Photographic Society of London elected her into membership in 1936. Last year she received the Arents Medal which Syracuse University each year gives to its most distinguished sons and daughters.

• • •

WOMAN photographers are stepping into the breach, replacing men who have been called to the colors. On the Jackson, Miss., *Daily News*, Bette

(*Continued on page* 75)

**Pvt. Howard Harsell (left) and Tommy Burns and Gladwin Hill of Wide World enjoy a meal of concentrated pack rations while on maneuvers deep in the California desert.**



*Official U. S. Navy photograph*

# Getting the Range!

ENEMY RAIDERS pay little heed to rainy weather. Neither do Navy gun crews . . . as flash photography shows in this picture of a protecting gun crew aboard an American merchantman . . . *taken in the rain.*

At sea, and on land and even in the air, flash bulbs are helping to get the picture every time, more effectively, independent of lighting conditions.

G-E MAZDA Photo*flash* lamps are proud to share in the wartime work of photography . . . glad that MAZDA Research can help the armed forces as it is helping the nation's press.

**What the G-E mark will always mean to you on a flash bulb**

1. MAZDA Research . . . with all its constant improvements of light output and flash bulb performance.
2. Sixty years of lamp-making experience that help assure you dependable uniformity.
3. More light at less cost. While MAZDA Research has been finding new ways to give you more light for better pictures, G-E prices have been repeatedly reduced.

*MAZDA research leads the way*

**G-E MAZDA**
**PHOTOFLASH LAMPS**
**GENERAL ELECTRIC**

*Sale!*

**An extraordinary offering of**

# SUN RAY ENLARGERS

**much below the regular price**

Said the Government to the manufacturer—no more enlargers for the duration. After August 3rd you concentrate on defense work entirely. So we took over the entire stock on hand at a big price reduction and WE'RE PASSING THE SAVINGS ON TO YOU instead of holding them for ceiling prices.

## THE MINIATURE

**Constructed on strictly scientific principles . . .**

Two condensers . . . 75 watt A 17 projection bulb . . . compact . . . portable . . . takes 35mm. or ½ vest pocket . . . makes 16″x20″ enlargement right on table, or by swinging or reversing head, will make 30″ enlargement on floor.

| ENLARGER (without lens) List $27 | SALE PRICE $16.20 |
|---|---|
| with 2″ f4.5 Gewironar lens. List $44.50 | 26.20 |
| with 2″ f3.5 Gewironar lens. List $48.50 | 27.70 |
| with 2″ f4.5 Trylor lens. List $54.50 | 27.20 |

## THE ARNOLD

A new type . . . all cast rigid streamlined enlarger . . . constructed with special care and precision, with every modern feature . . . two popular sizes.

| MODEL C 2¼x2¼ | SALE PRICE |
|---|---|
| without lens. List $45 | $31.35 |
| with 3″ f4.5 Trylor lens. List $77.50 | 44.10 |
| with 3″ f3.5 Kynor lens. List $82.50 | 42.60 |
| with 3″ f4.5 Ilex Paragon lens. List $67.50 | 42.60 |

| MODEL D 2¼x3¼ | |
|---|---|
| without lens. List $52.25 | 31.35 |
| with 3½″ f4.5 Ilex Paragon lens. List $74.75 | 44.60 |

*All are brand-new, latest models. Take advantage of these bargain prices while the supply lasts.*

**TRADE IN YOUR OLD ENLARGER — USE COUPON**

WILLOUGHBYS, 32ND ST. NEAR 6TH AVE., N. Y.

Please send me descriptive folder of Sun Ray Enlargers and let me know what you will allow on my old enlarger in trade-in for a

(SPECIFY MODEL INTERESTED IN)

My present enlarger is

MAKE..... SIZE..... MODEL.....

LENS..... CONDITION.....

NAME..... ADDRESS.....

CITY..... STATE.....

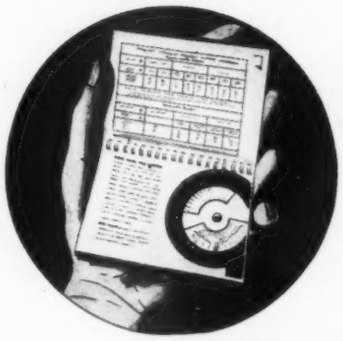
PP.

You, too, can have the

## *Photographic Exposure Computer*

that was designed for the

**ARMY and NAVY**



**$1.00 For Only postpaid**

This new exposure guide designed for photographers of the U. S. Navy, the U. S. Army Air Corps and the U. S. Army Signal Corps in any part of the world is now available for public use. It's the perfect guide for ground and aerial photography. It is printed from the same plates as the military edition, with a lighter weight cover material. It is simple, accurate, reliable, covering a wide range of light conditions for determining proper photographic exposures. Pocket size 3¼x5″. Durable as well as practical.

**MAIL ORDERS FILLED**

**USE COUPON**

WILLOUGHBYS,
32nd St., near 6th Ave., N. Y.

Please send me postpaid the Photographic Exposure Computer that was designed for the Army and Navy, for which I enclose $1.00.

Name.....

Address.....

City..... State.....

PP.

*Willoughbys*

**32nd St. Near 6th Ave., N.Y.C.**

ESTABLISHED 1898

*World's Largest Camera Store Built on Square Dealing*

# For More "PRIZE SHOTS" from Every Reel

## Take and Show MOVIES with A Revere 8 CAMERA AND PROJECTOR

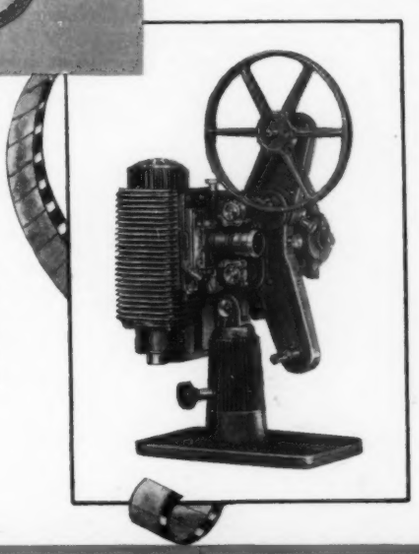
The fine results which are possible with Revere *precision-built* 8mm equipment are an inspiration to take more movies. The *simplicity* of the Revere Camera and its advanced features enable even the beginner to get *home movies* that are *sharp, correctly exposed,* and *steady.* The Revere has an *exclusive reciprocating sprocket control* which prevents the take-up reel from pulling the film too rapidly past the film gate. Because there is *no tugging* on the film gate, the pictures are absolutely *steady.* The Revere Projector is a worthy companion for this precision-built camera. Revere Camera Co., Chicago, Ill.

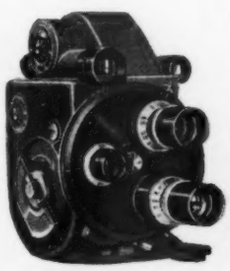
**REVERE "88" CAMERA**

is simple to load and easy to use. Built-in optical view finder. **5 speeds.** Eastman-licensed spool and spindles. **Exclusive reciprocating sprocket control** for steady movies. Complete with fast Wollensak F 3.5 lens..... **$38.50**

**REVERE "85" PROJECTOR**

excels in screen brilliance, film protection and convenience. **AC-DC motor. Double blower cooling system** for lamp and film. Radio interference eliminator. Micro tilt. **Duo-Shield light diffuser. Beam threading light.** Complete with 500-watt lamp, F 1.6 lens, one 300-ft. reel and deluxe carrying case..... **$89.50**





**REVERE "99" CAMERA**

has the same basic features as the "88," plus a **rotating turret head** for three screw type lenses, and an extra optical view-finder for use with telephoto lenses. Complete with one Wollensak F 2.5 lens..... **$77.50**

Buy U. S. WAR SAVINGS BONDS and STAMPS

**Revere** *Quality 8 m m Equipment*

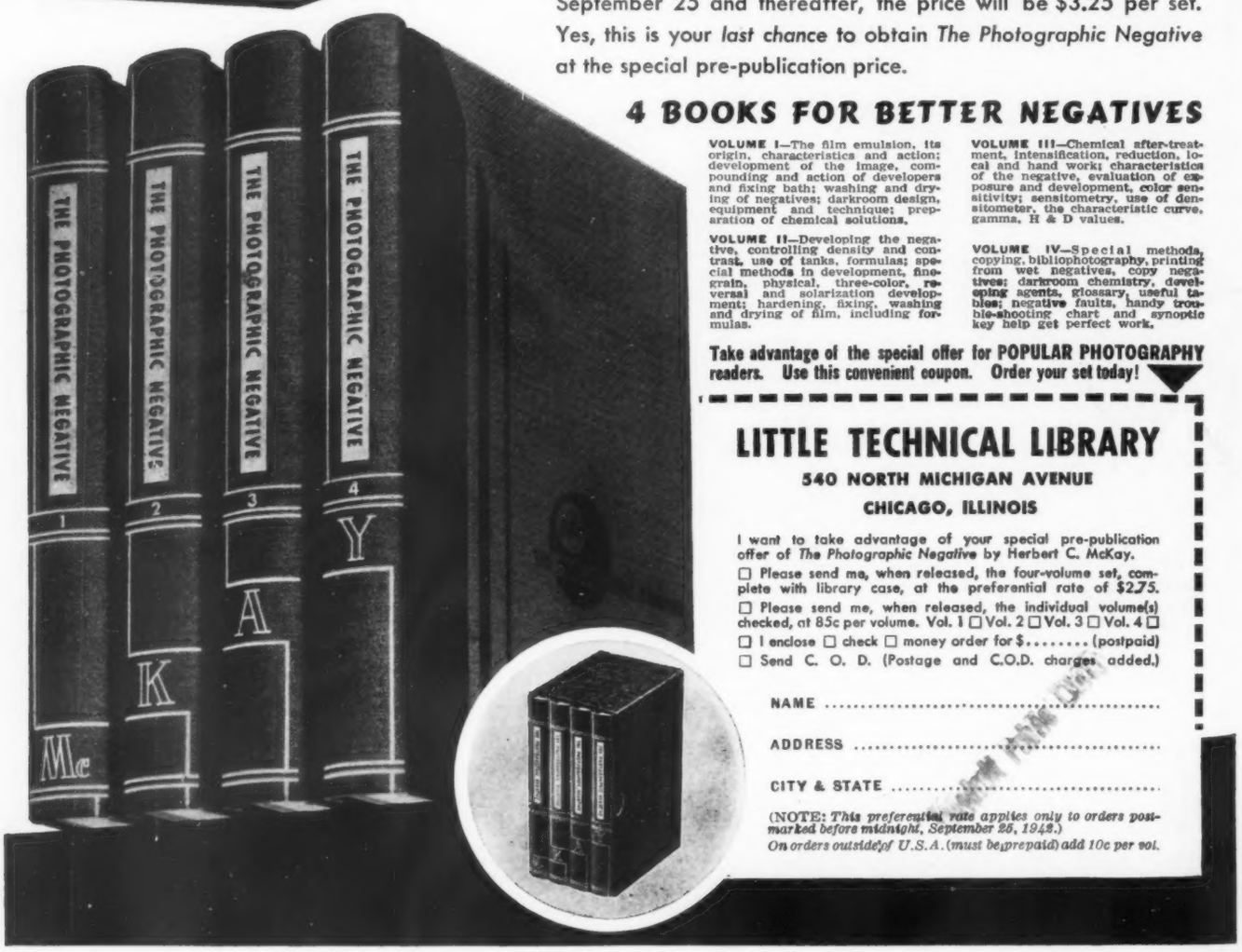
# HERE'S YOUR LAST CHANCE for this *Special* PRE-PUBLICATION OFFER!

***NO PHOTOGRAPHIC LIBRARY IS COMPLETE WITHOUT "THE PHOTOGRAPHIC NEGATIVE" ...HERBERT C. McKAY'S MONUMENTAL FOUR-VOLUME WORK ON DARKROOM TECHNIQUE***

**On September 25 the price increases! Until then you can order the entire 800-page, four-volume set, complete with library case, for the special price of ONLY $2.75.**

**ON AND AFTER SEPTEMBER 25, THE PRICE WILL BE $3.25 THE SET!**

Every phase of negative processing is covered thoroughly and understandably in *The Photographic Negative*. Profusely illustrated with informative charts, diagrams and photographs, these four beautifully bound matched volumes are bulging with up-to-the-minute information . . . valuable techniques, convenient formulas, tables of all types. No one is better qualified or more able to handle this important photographic subject than Herbert C. McKay, F.R.P.S. To readers of POPULAR PHOTOGRAPHY, the publishers offer *The Photographic Negative* at a special, pre-publication rate of **$2.75 for the entire four-volume set** . . . *complete with handsome library case!* But remember—On September 25 and thereafter, the price will be $3.25 per set. Yes, this is your *last chance* to obtain *The Photographic Negative* at the special pre-publication price.




## 4 BOOKS FOR BETTER NEGATIVES

**VOLUME I**—The film emulsion, its origin, characteristics and action; development of the image, compounding and action of developers and fixing bath; washing and drying of negatives; darkroom design, equipment and technique; preparation of chemical solutions.

**VOLUME II**—Developing the negative, controlling density and contrast, use of tanks, formulas; special methods in development, fine-grain, physical, three-color, reversal and solarization development; hardening, fixing, washing and drying of film, including formulas.

**VOLUME III**—Chemical after-treatment, intensification, reduction, local and hand work; characteristics of the negative, evaluation of exposure and development, color sensitivity; sensitometry, use of densitometer, the characteristic curve, gamma, H & D values.

**VOLUME IV**—Special methods, copying, bibliophotography, printing from wet negatives, copy negatives; darkroom chemistry, developing agents, glossary, useful tables; negative faults, handy trouble-shooting chart and synoptic key help get perfect work.

**Take advantage of the special offer for POPULAR PHOTOGRAPHY readers. Use this convenient coupon. Order your set today!**

**LITTLE TECHNICAL LIBRARY**
**540 NORTH MICHIGAN AVENUE**
**CHICAGO, ILLINOIS**

I want to take advantage of your special pre-publication offer of *The Photographic Negative* by Herbert C. McKay.

☐ Please send me, when released, the four-volume set, complete with library case, at the preferential rate of $2.75.

☐ Please send me, when released, the individual volume(s) checked, at 85c per volume. Vol. 1 ☐ Vol. 2 ☐ Vol. 3 ☐ Vol. 4 ☐

☐ I enclose ☐ check ☐ money order for $..... (postpaid)

☐ Send C. O. D. (Postage and C.O.D. charges added.)

NAME .....

ADDRESS .....

CITY & STATE .....

(NOTE: *This preferential rate applies only to orders postmarked before midnight, September 25, 1942.*)
*On orders outside of U.S.A. (must be prepaid) add 10c per vol.*

# Still Available — and stocked by most good Dealers!

NOW is the time to buy your enlarger and camera. Dealers' stocks are in most cases still complete. While priority restrictions and scarcity of vital materials have curtailed manufacturing schedules, limited stocks are still available. In SOLAR Enlargers, B & J Cameras, Accessories and Supplies you will find a perfection in design and construction that reflects our forty four years of continuous service to the photographer. Ask your dealer to show you these products today!

B & J 4x5" PRESS CAMERA

The choice of leading press photographers . . . men whose very livelihood depends upon successful pictures. Revolving back, plus precision adjustments with dual controls provide for speed and ease in operation . . . fits it to every picture making need from high speed sports action to "Prize Winning" Pictorials. Takes all press accessories.

LESS LENS and ACCESSORIES . . . . $54.50

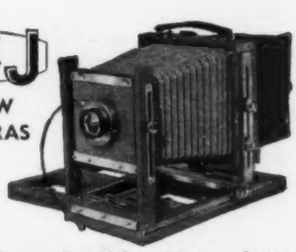
## WATSON MINIATURE PRESS

A precision 2¼x3¼ inch miniature press camera that offers all the conveniences and fine adjustments of the larger types of press cameras. Takes all standard press accessories, high speed lenses, etc. Gives you the added economy of miniature negative size.

PRICED FROM . . . . . $49.50

B & J VIEW CAMERAS

4x5"
5x7"
8x10"



*NEW* improved models, with new features . . . finer construction . . . more adjustments. Anti-bind metal slideways. Positive acting focusing lock. Extra long bellows. Meets all professional requirements. Available at your dealer in 4x5, 5x7 and 8x10 inch sizes.

PRICED FROM . . . . . $43.50

## SOLAR ENLARGERS— FOR "PRIZE WINNING" PRINTS

For sheer value and versatility, you can't beat a SOLAR. Prints of sparkling brilliance and full contrast . . . rich in pictorial rendering . . . are surprisingly easy to make with a SOLAR. A double-condenser optical system . . . vernier focusing . . . dustless negative carriers . . . counter-balanced head, and a new triple-intensity light system with a mercury contact switch make SOLAR today's "Big Buy" in Enlargers. Available for 35mm. to 5x7 inch negatives.

PRICED FROM . . . . . $41.50

SOLD BY GOOD DEALERS EVERYWHERE

MANUFACTURED BY

Burke & James, inc.

223 WEST MADISON STREET CHICAGO, ILLINOIS, U. S. A.

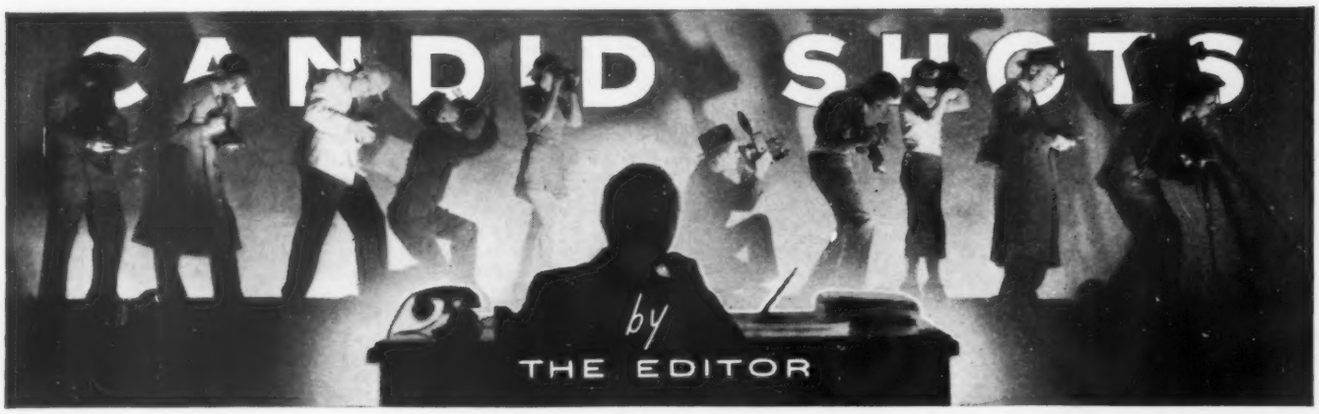
FREE BOOKLET

*Please send me your complete catalog.*

Name

Address

City State




PICTURES are coming in by the truck load for the 1942 POPULAR PHOTOGRAPHY *Contest*, but at this writing the judging has not yet started.

We have taken a couple of peeks and have come across quite a few honeys, but whether or not these pictures will be able to place in the Contest, we don't know yet ourselves. The general quality of the pictures seems excellent. It will fully justify both the prizes and the large amount of space we intend to devote to them in the big December Salon Issue.

IT'S too early yet to say anything definite about the size of this year's *Annual Salon Issue*. But we can already say that it is going to be bigger than any issue ever published by POPULAR PHOTOGRAPHY.

In fact, the 1942 Salon issue will be an Annual not only in the sense of making the December issue a volume of outstanding pictures, as in past years. It will compete in size, as well as in quality, number and variety of pictures with "annuals" in the field of photographic books.

In addition to scores of picture pages showing prize-winning pictures from the Contest, there will be many other unique pictorial features.

THE Photographers' Card, giving an officially approved digest of wartime regulations for picture taking, has brought a tremendous response both from photographers and from the authorities concerned with the enforcement of these regulations.

The card, compiled by POPULAR PHOTOGRAPHY and entitled "Wartime Regulations for the Photographer" is just what its title says. It's no "license" and no press card but was designed to help photographers and authorities alike in understanding wartime restrictions. Its second purpose is to protect the rights of photographers from over-zealous officers of the law who may not have understood the regulations fully.

To illustrate the existing confusion: The police chief of a town in Long Island, N. Y., asked us for cards because nobody ever told his department what should not be photographed. For similar reasons, the police chief of a sizeable town in Massachusetts has equipped 100 of his patrolmen with these cards. On page 18 you will find a letter from the New York Ordnance District asking for cards.

To date well over seven thousand readers have written us requesting copies of the card, and more than one hundred fifty thousand cards have been distributed through photographic dealers.

We hope that these cards will prove of real practical value and would welcome any news from readers regarding their experiences with the card.

A NEW color process, Ansco Color, has been announced by Agfa Ansco, but outside of stating that the photographer will be able to process it himself, no other information was made available. The new color film is produced at present only for the government and will not be placed on the market before the end of the war.

CALLING H. V. Lyle. There is a check waiting for you in payment for the pictures in this month's Salon Section. Had you not forgotten—as so many other photographers do—to write your address on the back of your prints, the check would not have to wait. As it is, we not only have no technical data on your pictures, but we don't even know whether you are a mister, missus or miss.

IF you want to read an amusing and revealing characterization of the amateur photographer, turn to publisher Richard L. Simon's article "The Dream Camera" in the August issue of *The Atlantic Monthly*. He knows what makes the socalled advanced amateur tick—being a rabid fan himself—and he manages to press a goodly amount of sound advice into very limited space.

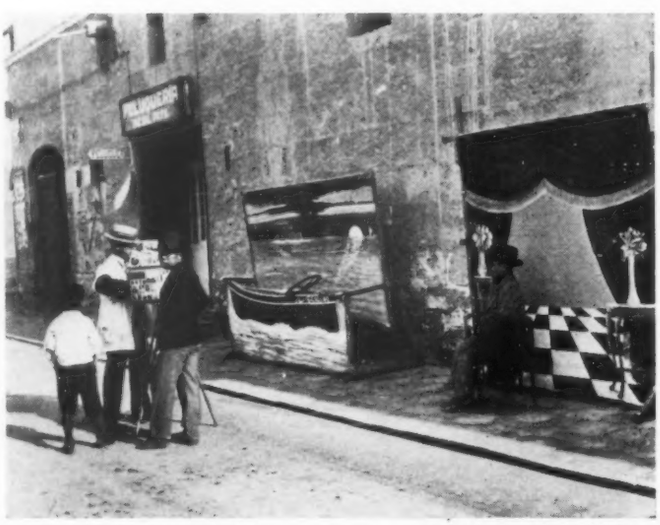
Mr. Simon's "Dream Camera" is the super-gadget which is to end all photographic problems and deliver the perfect picture every time. We wish that more amateurs knew as well as he does that no such thing is possible.

ONE reason why no single camera and no single style of picture taking can satisfy every photographic need is the variety of purposes for which pictures are taken.

We classify amateur photographers roughly in three groups: The snapshooter, the pictorialist, and the gadgeteer. The latter rarely gets around to taking pictures and if he does, he and everyone else feels sorry.

All of the more experienced amateurs outside of the gadgeteer class fall in the group of pictorialists. They are not satisfied with what they label as mere "snapshots," but want to make pictures which show creative ability and are outstanding as works of art and technique.

Knowing that most POP PHOTO readers belong in this class, we fully expected a storm of protests when we published Rep. Robert A. Wilkinson's article praising the virtues of the ordinary "snapshot" full of "distracting detail." Imagine our surprise when letters poured in, praising his call for a family album well stocked with corny snaps. They all seem to agree that in the long run these snaps will mean as much to them as the best pictures they ever took.—*A.B.H.*



While we work indoors with loads of fancy lighting equipment, this photographer goes on taking pictures in his open-air studio at Arequipa, Peru—and his customers seem satisfied with the results.

# "What he sees...he GETS!"

THERE's a familiar ring in those words to thousands of home movie enthusiasts. For "*what you see, you get*" has long been a tradition with owners of fine FILMO personal movie equipment, built by Bell & Howell.

Traditional, too, is the craftsmanship which makes that slogan an honest one—and, in this war, one of far-reaching significance. For today, as never before, the motion picture is an indispensable aid to our fighting forces. Each battle, re-enacted on the screen, is the basis for building better weapons, the key to new tactics, and the irrefutable scoreboard of achievement.

Pleasant in peace, but priceless in war is this assurance that "*what you see, you get*"—with the finest motion picture equipment that American skill and ingenuity can devise.

Filmo

**Bell & Howell Company, Chicago; New York; Hollywood; Washington, D.C.; London. *Established 1907.***

***MOTION PICTURE CAMERAS AND PROJECTORS***

PRECISION-MADE BY

Bell & Howell

# Questions & Answers

**V. A. G., Trinidad, B. W. I. Some negatives made about four years ago show yellow stains. On others there appear several pink spots which look like a fungus growth. Please tell me the cause of these stains and remedy for same.**

ANSWER: Yellow stains are probably the result of insufficient washing when films were developed. An article in this issue describes the method of bleaching and redeveloping. Possibly the fungus growth can be removed by washing, swabbing, and drying the negative again. If any damage has been done to the image, you will have to resort to retouching.

**A. W. C., Philadelphia, Pa. Recently I have had trouble with prints sticking to ferrotype tins that were carefully washed and polished. What might be the cause?**

ANSWER: Prints will often stick to the tins if there was not sufficient hardener in the fixing bath, or if the final wash water was too warm. Avoid forced drying by heat, or by placing tins in the sun to dry.

**W. H. G., Baltimore, Md. Recently I received a slightly used box camera as a gift, with no instruction booklet. Can you tell me the approximate lens and shutter speeds?**

ANSWER: Generally speaking, box cameras have a shutter speed of about 1/25 second and a lens speed of approximately *f* 16. When there is a choice of two openings the smaller is usually *f* 22. Where three stops are provided they are *f* 16, *f* 22, and *f* 32 in most cases. For information on your particular camera, write to the manufacturer.

**L. A. T., Omaha, Neb. I am planning to build an enlarger. What should be the focal length of the lens (I use 3¼x4¼ negatives) and how can I calculate bellows extension and projection distance?**

ANSWER: Focal length of the lens should be as long as the diagonal of the negative. Relationship of negative, lens, and paper for any size enlargement is determined as follows: To the number of diameters enlargement desired, add 1, then multiply by the focal length of the lens to obtain the projection distance. This distance divided by the number of diameters enlargement gives the bellows extension.

**J. W. M., Columbus, Ohio. I understand that the Government publishes an exceptionally fine manual of photography. How can I obtain a copy?**

ANSWER: The book referred to is "Basic Photography, Technical Manual No. 1-219." You can obtain a copy of the 342-page book by sending 35c in cash or money order (no stamps) to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

**R. H. F., New York City. Is a portrait attachment a positive or a negative lens?**

ANSWER: A portrait attachment is a positive lens. When placed over the camera lens, the combination has a shorter focal length than that of the camera lens alone. This permits you to get closer to the subject, and thus obtain a larger image.

**H. D., Chicago, Ill. My enlargements appear gray, and do not have sparkle like others I see. Even the parts that should be pure white are degraded. I use fresh paper and chemicals. Can you suggest a possible cause for this trouble?**

ANSWER: Your prints are probably fogged. Either the safelight is not "safe" for the paper you are using or the prints are allowed to remain in the developer too long. In any event, test the light by placing a silver coin on a test strip, exposing the strip to the safelight for about as long as it takes to expose and develop a print, and then develop the strip in darkness. If the paper is gray except for the spot where the coin lay, you will know that the fog is caused by your safelight.

**L. B. C., Tampa, Fla. What is the meaning of the term "extra-focal distance"?**

ANSWER: Extra-focal distances are the distances from lens to subject and from lens to film, in each case minus the focal length of the lens. They are used to simplify calculations in optical problems.

# LETTERS TO THE EDITOR

Dear Sir:

As Public Relations Officer of the New York Ordnance District, 80 Broadway, New York City, considerable time is spent in reviewing requests for permission to take photographs, or reviewing photographs confiscated because permission was not requested.

In connection with the latter your booklet, "Wartime Regulations for the Photographer" is certainly a step in the right direction to alleviate the condition. We feel that it is a good coverage of restrictions and hope ample quantities are left with dealers in photographic supplies.

This office would appreciate receiving 20 or 25 copies to be handed offenders brought to our attention. . . .

For the District Chief,
N. Y. Ordnance District.
D. B. MacMASTER
Captain, Ord. Dept.
Assistant

• We are glad to hear that the Photographer's Card has been found so useful by the authorities, as well as the thousands of amateurs who have requested copies.—ED.

---

Dear Sir:

. . . Recently I thought I would like to try a picture of some meadow grass. I am sending the photograph herewith . . . I

walked down the bank and took the picture, but someone saw me and called the police. I was stopped about two miles away, as there is an airport in back of the grass, about a mile distant . . . The picture is bad enough to warrant a life sentence, but I was released after being questioned. . . .

F. L. NORTON
East Haven, Conn.

• Even the most innocent of pictures can cause trouble, as this incident shows. Every photographer should know the regulations, and avoid taking his camera near restricted areas.—ED.

---

Dear Sir:

Many thanks for your prompt attention to my request for a copy of the "Wartime Regulations for the Photographer." It reached me Thursday morning, August 13th, which is excellent time considering that my request to you was mailed from here late on the 11th.

A. L. WYCOFF, Jr.
Rutherford, N. J.

• We must share your orchids with the swift service of the U. S. Mail.—ED.

Dear Sir:

. . . Not wishing to mutilate my copy of the August POPULAR PHOTOGRAPHY, I decided to make a photographic copy of the coupon for the Photographer's Card. This I did very easily, following the procedure given in your April issue . . .

J. SIDNEY GEIL
Penfield, N. Y

• And your copy was excellent.—ED.

---

Dear Sir:

Of all the asinine articles I have read in photo magazines during the last thirty years, your article in your current magazine, "Take Down Their Hair," takes the cake.

With half the female population of these United States wearing long, baggy pants and men's shoes, the one remaining spark of femininity is their coiffure and now the author of this article wishes to have them do away with this . . . If you do not print this letter, I will most certainly know how you stand in sportsmanship.

"ROD" SISSON
Alfred, N. Y.

• Since you insist on high-pressuring us, here is your letter in print. The author of the article described ways of taking a certain type of informal outdoor portrait, as explained in the first few paragraphs, and we doubt that many other readers were misled into thinking he had any wish to abolish the coiffure on a grand scale.—ED.

---

Dear Sir:

. . . In running through the August issue, I was struck by the large amount of space actually devoted to photographs. This made me like the August issue as well as any I have seen . . .

GEORGE B. PETTENGILL
Woodmont, Conn.

• You haven't seen anything yet. Wait for the big December issue, with its many prize-winning photographs from the 1942 POPULAR PHOTOGRAPHY Picture Contest.—ED.

---

Dear Sir:

In your "Salon Section" for September is a picture titled "Early Morning." In it I notice a copy of the *Miami Daily News*. This happens to be an evening paper.

The Sunday issue, however, is delivered in the morning—and the date-line of the paper in the picture shows that it is a Sunday edition. Many readers may ask for an explanation, so here it is . . .

GLENN W. CURTISS, Jr.
Spencerville, Ohio

• Here we are with a fine explanation of why an evening paper appears in a picture titled "Early Morning," and nobody bothers to ask us. Miami expatriates must know their newspapers.—ED.

---

Dear Sir:

I am inclosing a print I believe to be the same as the one published as your August "Picture of the Month." I was quite disappointed to find you had lost the bombardier's reflection on the front of the plane . . .

PAUL K. RIPLEY
Natick, Mass.

• The pictures are identical, except that the weak reflection was retouched out of the one we used. The photograph itself was of such great interest that it seemed undesirable to leave in a distracting oddity like the reflection.—ED.

## *Picture of the Month* (opposite page)

### TOMORROW'S FIGHTER . . . by Edward L. Hayes

The spirit of America's student flyers, champing at the bit as they await action, is portrayed in this unusual photograph. It is the result of a double exposure, with pictures carefully planned to fit together. (For Technical Data see page 72)

U. S. Navy bombers attack a Jap task force in this realistic presentation of the Battle of the Coral Sea. A fleeing convoy, its escort under heavy fire, retreats toward the horizon.

# SEEING THE WAR—

This "aerial photo" of a Geddes model shows North Africa as it could never be photographed. The cities are larger than scale to make them visible.

Norman Bel Geddes, the famous designer who conceived this use of tabletops, inspects a new aircraft carrier model.

Skilled artists, working from diagrams, set up battle scenes. Clouds of smoke and shell bursts are solid props, used over and over. Every detail must be accurate to insure getting a realistic effect (right).

# IN "TABLETOPS"

by BRUCE DOWNES

**By special arrangement with Norman Bel Geddes and Life magazine, POPULAR PHOTOGRAPHY brings you this exclusive story of how the world's most elaborate tabletops are executed.**

*Tabletop photographs by courtesy Life magazine.*

NAVAL battles, by reason of their magnitude and confusion, have never been photographed clearly and completely. Yet *Life* magazine in recent months has published photographs of the Coral Sea and Midway battles so remarkably realistic that readers, until they read the captions, never even suspected that they were super "tabletops" conceived and executed by Norman Bel Geddes, the famous industrial designer.

In those pictures tabletop photography, formerly in the category of camera tricks indulged in by amateurs on long winter evenings, came of age, and Norman Bel Geddes silenced once and for all those sobersides who scoffed at the business of fiddling with small models and gadgets in imitation of nature. Tabletop photography *is* important, and the extent to which Geddes has developed it is simply another inspiring reminder that photography's potentialities are enormous and that the door of opportunity is wide open to those who are capable of seeing beyond their noses!

If Geddes had turned up his nose at tabletop photography, the 3½ million or so readers of *Life* would not have thrilled to the exciting spectacle of great naval battles presented photographically. As it is, they saw vividly what happened in the Coral Sea and at Midway—two battles in which United States forces badly crippled the Japanese fleet—in photographs that showed the ships and planes in action on a vast expanse of shimmering sea with bursting bombs and smoke belching from the bowels of wounded warcraft. And it was all done in the studio with artificial water, model ships, paint, plaster, cement, lights, a variety of fabrics, and all the legerdemain of the camera. The pictures were made possible through the ability of a distinguished industrial designer, his technical staff, and a great news-gathering organization. For the first time in the history of journalism, tabletop photograhy had played a vital and exciting part in reporting great events in a world at war! It was a dual enterprise. Geddes' model shop furiously constructed models of the ships to be portrayed—*Life's* organization worked in New York and Washington and through foreign correspondents to assemble full details of the battles. When these were reduced to diagrams, *Life's* research men and editors watched

(*Continued on page* 90)

This unusual picture shows a red-eyed vireo with a young cowbird that usurped a place in its nest. It was taken by Dr. Eliot Porter, 1941 recipient of a fellowship to photograph birds of the United States.

Wright M. Morris, 1942 Guggenheim fellow, is making photographs of buildings and houses. They are to appear in a book, accompanied by his own imaginative description of the people who live and work in them.

# FELLOWSHIPS FOR PHOTOGRAPHERS

**by ARTHUR J. BUSCH**

**Grants from the Guggenheim Foundation enable photographers of outstanding ability to devote a full year to creative work.**

IN 1937, after awarding fellowships to scholars and creative workers for twelve years, the John Simon Guggenheim Memorial Foundation granted Edward Weston $2,500 with which to make his now famous photographic record of California and the West. Weston found himself that year among some fifty scientists, poets, composers, painters, and writers honored by the Foundation. For the first time, it had recognized photography as one of the fine arts.

Perhaps photographers had not known of the Guggenheim Foundation's largesse, or they may not have thought of themselves as creative workers. Prior to 1937, very few of them applied for fellowships. But Weston broke the ice, and proved that photographers, along with painters, poets, and writers, could look to the Guggenheim Foundation for financial assistance in important work.

As a result, the number of photographers applying for the coveted annual patronage has increased enormously. But only four, in addition to Weston, have actually made the grade. These were Walker Evans (1940), Dorothea Lange (1941), Dr. Eliot Furness Porter (1941), and Wright M. Morris (1942).

Thus out of 40 to 60 fellowships granted each year, or approximately 300 in the last six years, only five have gone to photographers! Yet the Foundation's doors are wide open to camera workers. Their applications are given exactly the same consideration as those in other arts.

There are virtually no restrictions, save a very important one that constitutes the chief stumbling block for would-be recipients of fellowships. Here it is, in the Foundation's own words.

"*Fellowships are intended for men and women of high intellectual and personal qualifications who have already demonstrated unusual capacity for productive scholarship or unusual creative ability in the fine arts.*"

This means exactly what it says, and to emphasize it, the Committee of Selection requires *evidence* "that candidates are persons of unusual capacity for research, demonstrated ordinarily by the previous publication of contributions to knowledge of high merit, or that they are persons of unusual and proved creative ability in some one of the fine arts."

F. S. A. Photo by Walker Evans

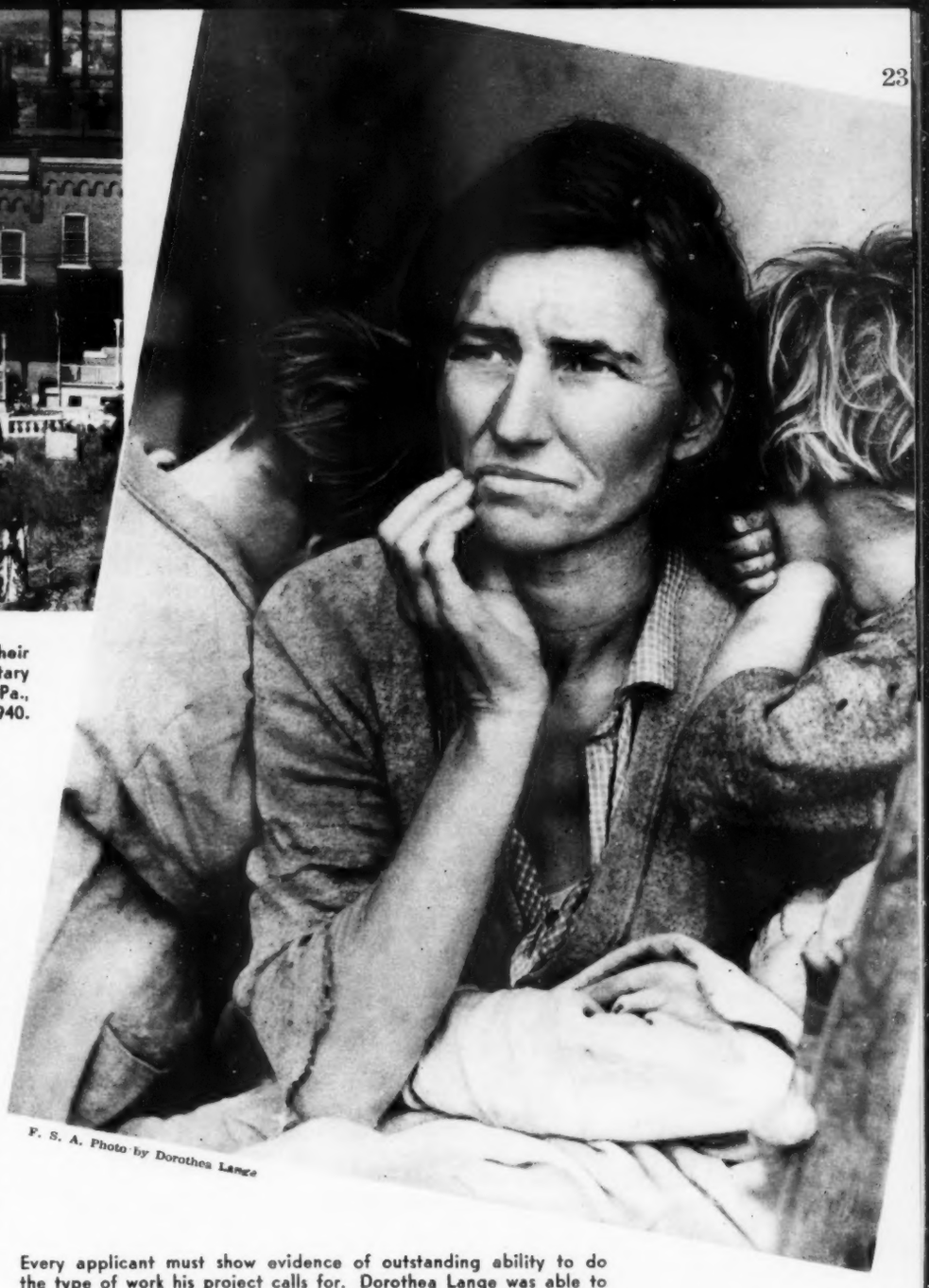
**Some fellowship recipients are well known for their pictures. Walker Evans took this fine documentary photograph in the steel mill area of Bethlehem, Pa., five years before his grant was announced in 1940.**

In plain words, only photographers of responsibility who can meet those conditions need apply. It would be foolish, indeed, for a run-of-the-mill photographer to waste his time asking the Foundation for a year's snapshooting on the house.

The Foundation is not running annual contests—as not a few photographers have assumed. It was established by the late Senator Simon Guggenheim and Mrs. Guggenheim in 1925, as a memorial to their son, John, who died in 1922. It exists to extend generous financial assistance to scholars and creative workers in the fine arts, and to this end makes outright grants of money up to $2,500 for a year's tenure, the money to be used on definitely outlined projects. The purpose of the grant is to relieve the fellow of all other duties during the period of his tenure (usually twelve months) thereby leaving him unencumbered by economic burdens.

As an example of the qualifications required by the Foundation, those of Walker Evans, who was made a fellow in 1940 for the specific project of making

(*Continued on page* 82)



F. S. A. Photo by Dorothea Lange

**Every applicant must show evidence of outstanding ability to do the type of work his project calls for. Dorothea Lange was able to present this famous picture of a migrant worker's family when she sought her grant to make a photo series on the American social scene.**

**Edward Weston was making fine pictures of the West long before 1937, when he was awarded the first Guggenheim fellowship to go to a photographer. The uprooted cypress (left) is typical of his early work. His ghost town picture (right) was taken during the year he was making his famous photographic study of California and the West on Foundation funds.**

# MODEL DARKROOM

**by L. C. MACKENZIE**
Photographs by the Author

**Every photographer dreams of a darkroom, tailor-made to fit his own needs. Here is one you can build yourself, making it portable for moving if you wish.**

This plywood darkroom can be built to fit into any attic or basement. Size can be varied according to needs, but the 6x8-foot room shown here provides space for essential equipment. If a permanent setup is practical, the cost can be cut by use of existing walls, floor, and ceiling.

# HAS EVERYTHING

EVERY photographer needs a good darkroom. Bathroom and kitchen makeshifts suffice where only a temporary setup is practical, but every camera user dreams of having a real workroom that will enable him to keep his equipment always ready for use.

If space is available, it's easy to rig up a darkroom that will fit your needs. It can be made permanent or portable, and as simple or elaborate as you wish.

If you are worried about moving and leaving a built-in darkroom behind, you can follow these instructions for making a unit that is completely portable. If not, you can economize by constructing a permanent setup. Where a corner is available, only two walls need be built. If they are suitable, the original floor and ceiling can be employed.

Some of the first problems to consider in building a darkroom are its location, size, and cost. A basement or an insulated attic is a good choice, and the cellar has the added advantage of providing easy connections for water, drainage, and electricity.

For a permanent setup, the size can be determined according to space available and convenience in making use of facilities already on hand. A portable darkroom is best built around stock sizes of material, eliminating waste and using the accurate factory cutting. I decided on 6x8 feet for my portable unit.

Posts and braces are eliminated, as the walls, floor, and ceiling provide the necessary structural strength. This makes plywood a logical selection. Here is the list of stock size panels used:

4 panels 4′x6′x⅜″—floor and ceiling
4 panels 4′x7′x⅜″—front and rear walls
4 panels 3′x7′x¼″—side walls
1 panel 4′x6′x¾″—work tables
1 panel 30″x6′x¾″—printing table
1 panel 4′x8′x¾″—shelves, etc.
1 panel 4′x8′x¼″—misc. uses

This is all the lumber you will need, excepting about 500 feet of 1¼″x⅝″ finishing strip. It seems like a lot, but this material is inexpensive and has many uses in the darkroom. The total cost of lumber was $40.00.

Add to this a few pounds of finishing nails, ⅞″ and ½″, and four or five dozen ordinary screen door hooks and eyes, and with a few simple tools like a hammer, saw and square you are ready to start building operations.

To make the floor, line up two of the 4′x6′x⅜″ panels side by side, face down, and tack 50″ lengths of finishing strip about 6 inches apart across the width of each panel. Place the ends flush with the outside edges, but let them project 2″ beyond the inside edges. The finishing strips will interlock when the darkroom is assembled, holding the floor rigid. When you get about half way, overlap the finishing strips in the opposite direction. This will give added strength to the unit.

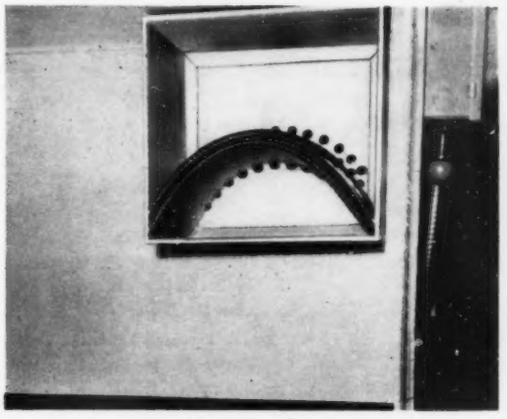
When this is completed and the panels line up perfectly, turn them over and check to see that the assembly is level in the space selected for it. If it is high at one point, simply trim down the section of finishing strip at that point. If it is low, build up under that point with thin strips of wood, tapering off as required.

These strips provide a simple method of adjusting the floor level, as well as providing strength and rigidity. They also create an air space between the cement basement floor and that of the darkroom.

Now form a ⅜″ channel to receive the lower edges of the wall panels around the outside edge of the entire floor, with the exception of a 2-foot space allowed for the door. Use finishing strips nailed flat to the floor a distance of ⅜″—the thickness of the panels—from the outside edge. Form the outside of the channel with strips nailed to the edge of the floor and at right angles to it, as shown in the

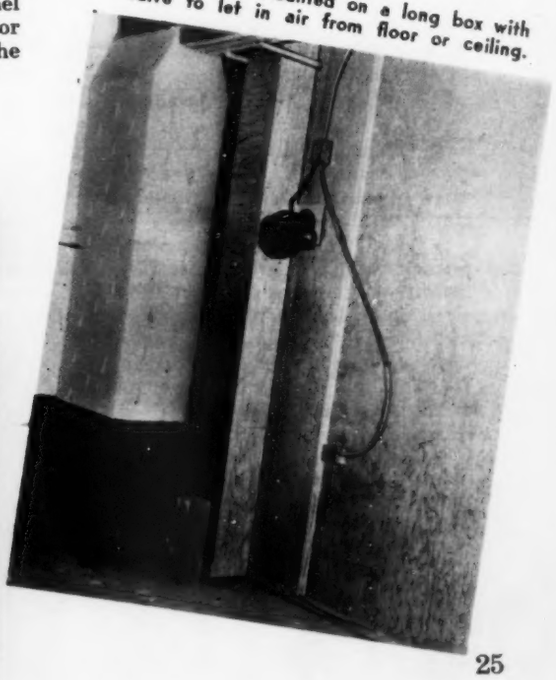
(*Continued on page 86*)

Air is cleaned at the intake, passing through sieves containing steel wool soaked in oil.



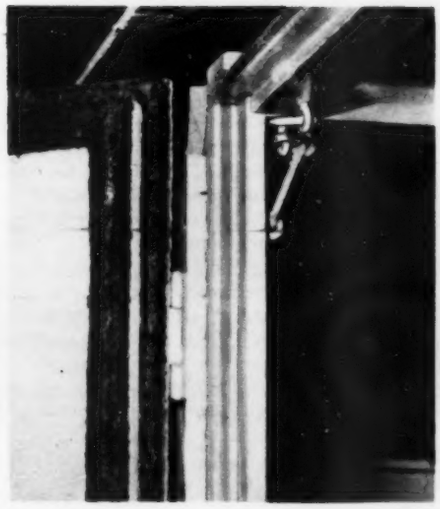
Prints are dried in a box in front of the air vent, where a stream of air speeds the process.

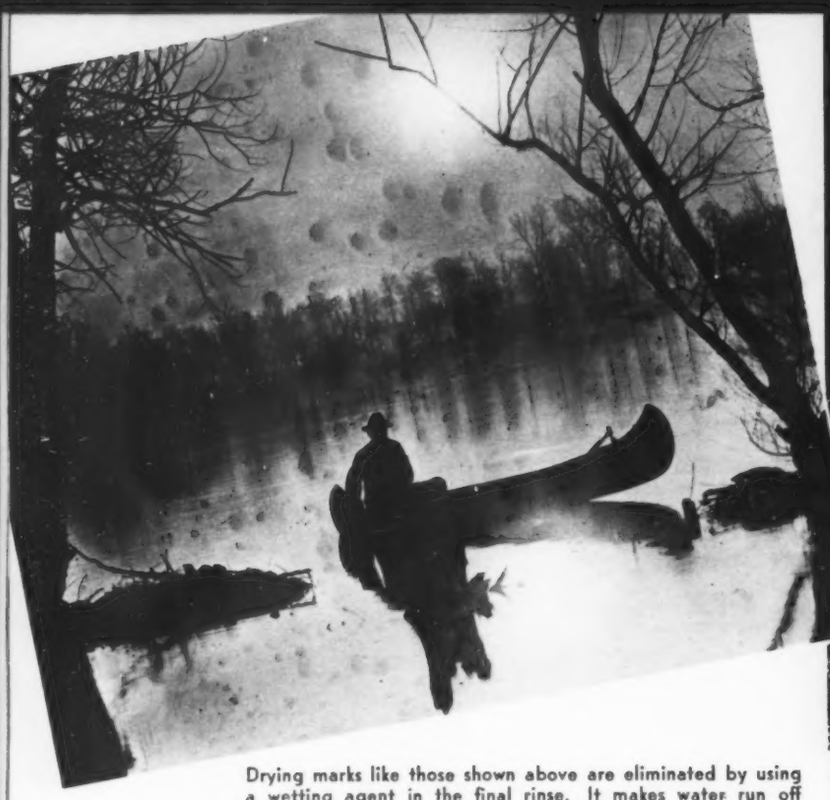
Intake fan is mounted on a long box with valve to let in air from floor or ceiling.



The sink is set flush with table top, and is equipped with a pair of mixing faucets.

Screen-door hooks and eyes, bent to keep tension, hold darkroom sections together.





Drying marks like those shown above are eliminated by using a wetting agent in the final rinse. It makes water run off without forming drops. Foam marks (right) may be caused if improperly selected agents are used in developing solutions.

# The Truth About WETTING AGENTS


## by R. W. HENN

Kodak Research Laboratories, Rochester, N. Y.


***These new products have won a deserved place in the darkroom, but they are no cure-all for photographic difficulties, no substitute for careful processing.***

Used in the developer, wetting agents make the solution cling to the film. This greatly reduces the chances of producing airbells, which cause pinholes that make black spots on prints.

WHAT are wetting agents? What do they do? How can I use them in my photographic work? Are they really as marvelous as some have claimed, or are they just over-publicized chemicals in pretty bottles? These are typical questions we shall try to clarify in this article.

A better idea of wetting agents is obtained by understanding how they work. Essentially they cause water to cling to a surface rather than to merely touch it, to lie on it as a uniform layer rather than to collect in drops—in other words to "wet" it. While water may cling to absolutely clean surfaces, such surfaces must be specially prepared and are rarely met with in practice.

Many of the wetting agents are marketed under trade names. Most of these cover chemically different compounds, each of which may be most exactly suited for a particular application. Typical examples include the Aerosols, Dreft, Gardinol, the Arctic Syntexes, Foto-Foam, Kodak Water Spot Preventive, etc.

In addition to possessing great wetting power, those which are applicable to photographic processes have other advantages. They are more soluble, and form clear solutions in water, and in many cases, in photographic developers. This is important, because a wetting agent which doesn't dissolve completely can cause a great deal of trouble with mottle on film.

The various photographic applications of wetting agents are based on their ability to make water or other solutions spread out uniformly and rapidly over the film. Uneven wetting is the source of several negative faults. This is especially true when the film has been handled enough to become slightly oily.

Unfortunately, the enthusiasm of a few advocates of these agents has run far ahead of their experiments. While wetting agents will do many things, they won't take the place of normal, careful procedure. They are no cure-all. Further, improperly selected wetting agents may cause special troubles all their own.

Properly selected wetting agents make four main contributions to photography.

(*Continued on page* 76)

Enlarging is the easiest part of mural making. The image can be projected on the floor or on a wall.

Narrow, home-made trays are used for developing. The prints are rolled back and forth, first one end on the inside and then the other, to obtain even action and avoid streaks.

# *Making Murals*
# IN ANY DARKROOM

by A. L. FRANCIS
Photographs by Bal Wilcox

**You can make giant enlargements without special equipment by using this simple method of rolling them in the developer.**

SALON exhibitors and professional makers of murals have no difficulty in handling prints of any size from 16 x 20 on up. For them, developing big sheets of paper is easy—they have large trays and plenty of workroom space. You, too, can turn out pictures just as big, without investing in oversize equipment, if you roll the prints during development in trays of your own manufacture.

Projecting a large enough image is the easiest part of making a mural. It is a simple matter to turn your enlarger around on its upright and project onto the floor, or set it up horizontally and use a wall as your easel. Proper trays for developing, fixing, and washing are the main problem, as an occasional large print hardly justifies an investment in the huge trays ordinary procedure requires.

Here is where a little ingenuity will save some money. For the photographer who wants to make a few big prints and has the ready cash to buy paper, there is a method used by some commercial finishers of murals which is adaptable to home use. You can do as they do, rolling your prints as they develop and fix, in long, narrow trays that you can make yourself at little cost.

The first step is a trip to the nearest store where you can purchase several yards of oilcloth. A word of warning—roll that oilcloth. It will be good practice for developing the prints later. Don't fold it; the creases will wear through and develop leaks instead of prints.

Next, get some shallow boxes. They need be no wider than the narrowest dimension of the print. In the case of a 16x20, for example, the longest part of the box need not be more than 17 or 18 inches. This is possible because you are going to roll the prints during development, instead of laying them flat in the customary manner.

Line the boxes with oilcloth, tucking in the corners as shown in the illustration, folding so that the solution will not leak out.

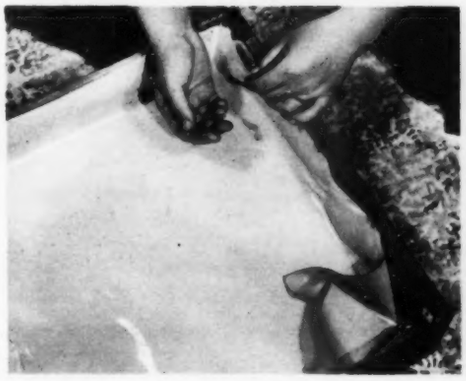
The boxes can be picked up anywhere and cut down to size, or made of plywood. If space is at a premium, don't make them too big. They should be oblong, with the length dependent upon the narrowest dimension of the largest print you plan on making. Allow an extra inch or two for leeway in handling.

Now that the boxes have been lined and the solution poured into them, you are ready to go ahead and start printing. Begin with test strips, of course, to determine exposure and developing time.

When the paper has been exposed, don't let habit get the better of you. That piece of paper can be developed just as easily by rolling as it can be by the

(*Continued on page* 88)

An oilcloth lining makes any box a waterproof tray, with corners carefully folded and tacked.



Prints can be washed by rolling them in sink or bathtub. Backing paper must be wet, too.

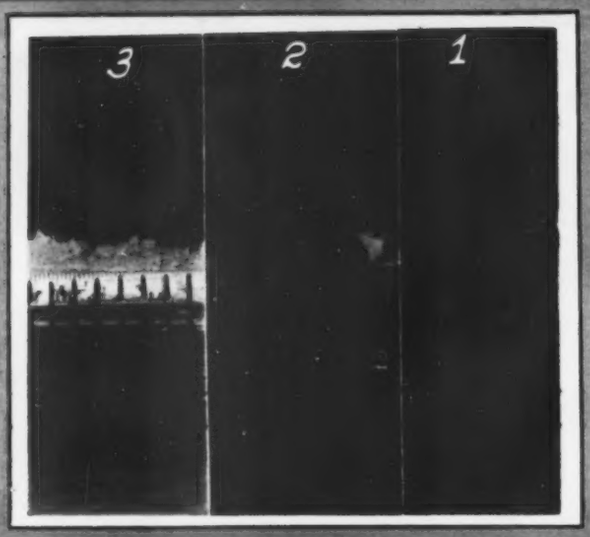



Fig. 1. Section 1 shows original negative. Section 2 was treated by Method I, section 3 by Method II. Note fog on border and the extreme shadow density before treatment.

Fig. 1a. Contact print of negative, left, made on grade No. 2 paper. Section 2 shows fog removal and contrast decrease. In section 3, shadow density was greatly reduced.

# SEVEN METHODS OF CORRECTING YOUR NEGATIVES


## By PHIL A. FRIEDELL

Friedell Laboratories, Oakland, Calif.


**Don't discard a negative just because it is too dense or too thin to produce a good print. In most cases you can correct it by using one or more of these simple methods.**

PERFECT negatives are indeed a rarity. The amateur occasionally makes one, but he also makes many which could be improved by some suitable after-treatment.

I recently improved a process of negative correction which I have used for more than thirty years. It has a latitude sufficient to include substantially the entire scope of all known intensifiers and reducers, and every type of correction.

These include (a) removal of chemical, age, or uniform light fog, and overexposure, with either simultaneous reduction of contrast, or maintenance of the original contrast of the negative; (b) over-all reduction of contrast to any desired degree; (c) over-all intensification to any desired degree; (d) reduction of extreme highlights only; (e) intensification of the weak shadow details coupled with simultaneous reduction of the extreme highlights.

Many of the failures and unsatisfactory results which accrue when various intensifying and reducing processes are used, are attributable to improper handling of the negative. It is difficult to obtain uniform reaction in all parts of a negative through the rocking of a tray. For this reason I have adopted the use of clear, *colorless* glass jars with caps which can be tightly sealed. The most satisfactory size of jar is one in which the negative forms about five-eighths to seven-eighths of a cylinder within the jar. The ends of the negative must not overlap. Jars should preferably be of the wide-mouth variety in which the mouth of the jar is about equal in diameter to that of the body.

The jars must have tight-sealing caps, such as Economy, glass, bakelite, or glazed or paraffinized paper-lined screw caps. With Economy caps, coat both the sealing cap with the exception of the sealing ring, and the screw cap, with bakelite *polish* (not varnish, which is too difficult to dry). Bake at a boiling temperature or slightly higher, but not in excess of 300°. Bakelite polish is available through some variety and hard-

Fig. 2. Here section 2 was treated by Method III, and section 3 treated successively by Methods II, V, and VI.

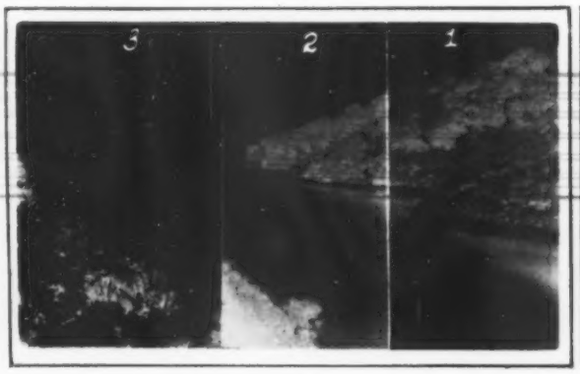



Fig. 2a. Contact print of negative (Fig. 2) shows the results of treatment. It was made on grade No. 2 paper.

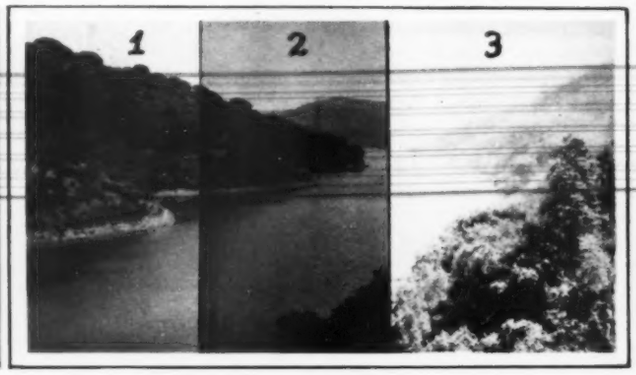



Fig. 2b. Print of section 3 on grade No. 0 paper.

ware stores. Give tin screw caps the same treatment, and if the paper lining is not oiled, glazed, or paraffinized, coat it with bakelite polish and bake, or saturate it with hot paraffin. Wide-mouth jars in which jams, peanut butter, mayonnaise, and similar products are marketed, are perfectly suitable.

For plates and larger film negatives, use colorless glass or white enameled trays. Support glass plates between the fingertips, glass side up, and rock the plate, not the tray.

Due to the sensitivity of the bleached emulsion to daylight, bleaching should be conducted in artificial light if the negative is to be reduced. After the desired reduction has been completed, if the negative is to be intensified, increased densities result if the bleaching is conducted in ordinary interior daylight. Solutions and wash water should be kept within the range of 68 to 72° F.

Before outlining the corrective methods, a few of the terms used should be defined. When *special agitation* is prescribed, the procedure is as follows: Place the negative in the jar with its *emulsion side in*, so that the back of the negative can be constantly observed through the side wall of the jar. Fill the jar just *to the top of the negative* with the specific solution which is to be used, and screw the cap on tight. Hold the top of the jar in the right hand and the bottom in the left hand. Ease the grip on the top of the jar and grip the bottom with the left hand; swing the right hand under and the left hand over. Next, grip the top of the jar and ease the grip on the bottom, and swing your hands back to their original position. Carry out this alternating movement at any convenient speed, say once every few seconds. You will find that with each movement the jar is simultaneously rotated and tilted, with rotation always in the same direction. The back of the negative is always visible, and with each revolution the end borders project up out of the solution.

*Rinsing* means that the jar is to be filled with water and emptied immediately. *Washing* means that the jar is to be filled with water and permitted to stand for a minute or two before emptying.

### METHOD I. Removing Chemical, Age, or Uniform Light Fog, While Simultaneously Decreasing Contrast of the Negative.

#### Stock Bleaching Solution—P-1

| | Metric | Avoirdupois |
|---|---|---|
| Water | 500 cc. | 16 oz. |
| Potassium ferricyanide | 12 gm. | 175 gr. |
| Potassium bromide | 12 gm. | 175 gr. |

#### Cleaning Solution—P-2

**Dissolve one teaspoonful of "Dreft" in a pint of water. "Dreft" is a soap substitute which can be purchased in grocery stores and public markets. This solution removes oily finger marks and also functions satisfactorily as a wetting agent. It should be renewed every two or three weeks.**

The total fog present in any negative is exhibited in the border. If there is no

(*Continued on page 92*)

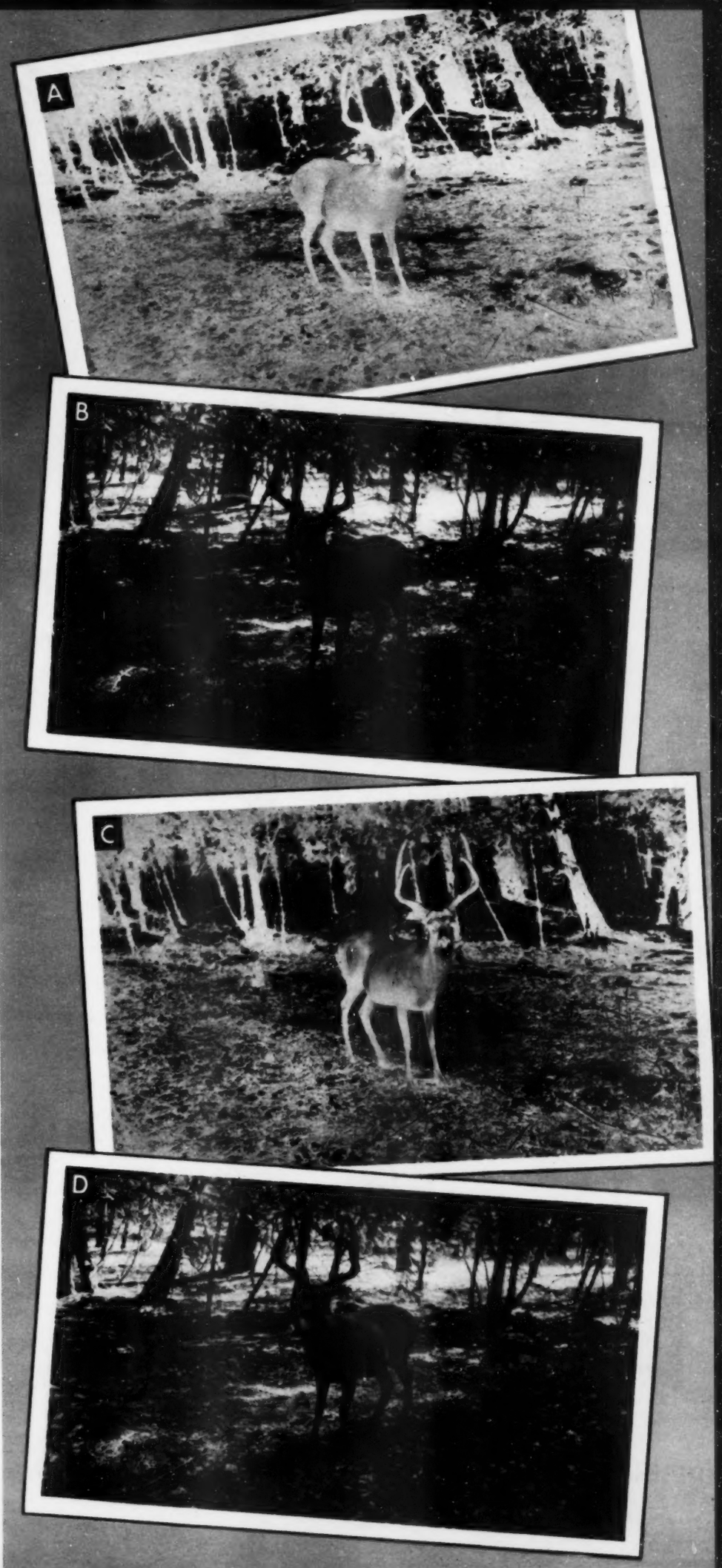



Fig. 3. Lack of brilliance in thin negative A is shown in the contact print, B. After successive treatments by Methods VII, VI, and V the intensified negative C produced a greatly improved print, D.

# Save that Print!

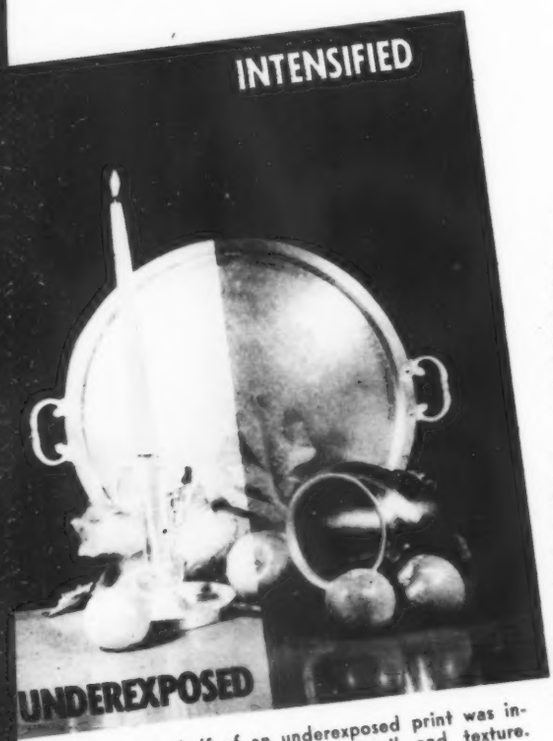
Proper reduction produced a usable normal density in the upper portion of this overexposed test print.

Stop filling the wastebasket with under- and overexposed prints. You can save that paper by using the corrective measures described here.

**by DON D. NIBBELINK, A.R.P.S.**

Agfa Ansco, Binghamton, N. Y.

***Don't waste valuable material by throwing away those unsatisfactory prints. Many can be saved by simple, inexpensive processes.***




Here the right half of an underexposed print was intensified to bring up the lost detail and texture.

IF your prints are too dark or too light, don't throw them away; they can be saved. Darkroom wastebaskets accumulate a staggering amount of printing paper, much of which does not need to be discarded. Many unsatisfactory prints can be reclaimed by processes that are simple to learn and inexpensive to use.

Underexposure and overexposure are undoubtedly responsible for a large portion of this waste of valuable material. Perhaps it is easier to make another print than to fuss with various methods of after-treatment in an effort to salvage a picture. Nevertheless, paper costs money, and in these days we must conserve both.

Intensification and reduction have long been applied to negatives and lantern slides, but these processes are not frequently used with paper prints. They can be, however, and no technical knowledge is required to employ them for salvaging prints that are too dark or too light.

### Print Intensification

Intensification of a paper print produces an increase of over-all density, and often remedies an unpleasant tone, when the print has been underexposed or underdeveloped. Although many toning processes strengthen the image and can be used for intensification, this procedure must be supplemented by a more favorable method if a neutral tone is desired. Toners which have an intensifying action are generally single-solution toners, and should be avoided for intensification unless colored images are desired.

Among the various intensifiers for negative materials, chromium is the only one that can be recommended for use on

**UNDEREXPOSED**

**An underexposed print lacks snap and detail; but don't discard it. Use one of the methods described to convert it into a good picture.**

paper prints. This is because many other solutions owe their intensifying properties to a staining action, or else their effect depends on production of an image that may not be permanent, as does the mercuric chloride intensifier. Potassium bichromate overcomes these difficulties, as it has the advantage of yielding a permanent brown-black image. Also, the amount of intensification can be easily controlled. Two stock solutions should be prepared; each will keep indefinitely.

**Stock Solution A**
10% solution potassium bichromate.

**Stock Solution B**
Hydrochloric acid diluted to ten times its volume with distilled water.

The degree of intensification can be partially controlled by the percentage of hydrochloric acid present in the bleaching bath—the more acid that is used, the less will be the intensification, and vice versa. Although the action will depend greatly upon the characteristics of the original print image (whether it is fine-grained; type of emulsion; etc.), the following table will serve as a basis from which to deviate according to individual cases or the dictates of past experiences. The working bath should be made up just prior to use.

| | Light | Medium |
|---|---|---|
| Stock Solution A | 20 units | 20 units |
| Stock Solution B | 40 units | 10 units |
| Distilled water to make | 100 units | 100 units |

In order to avoid any reversal of the silver chloride image, all operations directly concerned with the intensification should be carried out in light that is no stronger than normal tungsten illumination; intense sunlight in particular should be avoided. The print is placed in a tray of water for at least ten minutes so that the gelatin emulsion can become fully expanded. This will allow bleaching and subsequent operations to act uniformly over the entire surface of the picture.

The print is then bleached until the

**CORRECTLY EXPOSED**

**This is the kind of print we like to make. Many which do not come up to this standard, however, can be corrected by simple processes.**

traces of the black silver image have been removed. This occurs in about five minutes. Do not allow the print to remain in the bleach longer than necessary; not only is the bichromate more difficult to remove from the paper, but it may cause streaks to appear in the finished print. Next, place the print in running water for about 10 minutes until the orange coloration has been completely removed. Immersing the bleached print in a 5% (approximately) sodium carbonate solution (which causes the gelatin to swell slightly) will facilitate the ease with which the bichromate can be removed.

The preferred print redeveloper is any usual metol - hydroquinone developer. The redeveloped image appears in normal time. In a few developers the image is

**OVEREXPOSED**

**The dark, overexposed print can be salvaged, too. An easy method of after-treatment will reduce the image to give you a normal print.**

formed very rapidly at first and then apparently does not change, although it actually increases gradually for several minutes afterwards.

If the intensification action does not appear to have been sufficient, the procedure can be repeated, but there is little to be gained by intensifying prints more than twice. The tones produced in this manner are permanent as well as pleasing; for this reason chromium intensification can be used not only as a means of strengthening the image, but also to remedy an unpleasant print tone. The intensification is not proportional in its action, but rather one in which the highlights are intensified proportionally more than are the shadows. This property is very useful, as underexposed but fully developed prints are often characterized by lack of highlight details.

### Print Reduction

Chemical reduction is a valuable method of saving prints that are too dark. There are three main causes of excessive print density: (1) overexposure either normally developed or underdeveloped; (2) overdevelopment; and (3) the use of paper with too great an inherent contrast. The selection of a print reducer will be determined by the contrast (gradation) desired in the finished print. Reducers are available which can either increase of decrease the original contrast, or act proportionally, keeping the relative print values practically the same while whittling down the overall density. Controlled print reduction is easy to attain; just remember that the part to be removed comes off easily but is difficult to replace.

As in intensification, reduction depends upon the character of the original print image. The other factors that also influence the results are the solution used, its dilution and temperature, and the length of its application. The use of each of these "dark-print remedies" is dependent on the needs of a particular print, as follows:

**1—a. The print is overexposed and underdeveloped.**

This type of print can be recognized by its characteristic "dark and muddy-all-over" appearance resulting from excessive exposure and brightness differences that are unduly compressed because of the lack of sufficient development. The usual tendency is to take these prints out of the developer when it is seen that the image is becoming excessively dark.

REMEDY: An adaptation of the well-known Farmer's reducer should be prepared as follows:

**Solution A**

Sodium thiosulfate (hypo), 20% solution....150.0 cc.

**Solution B**

Ferricyanide,* 10% solution.....50.0 cc.

* Either potassium or di-potassium mono-sodium ferricyanide can be used.

Take equal parts of Solution A and B to make the stock solution. Although separate solutions of hypo and ferricyanide have adequate keeping properties, the combined stock solution has a tendency to decompose (indicated by a deep blue color), particularly under strong light. Therefore, whenever possible, the working bath should be prepared just before use.

(*Continued on page 94*)

# MIRROR AIDS COPYING

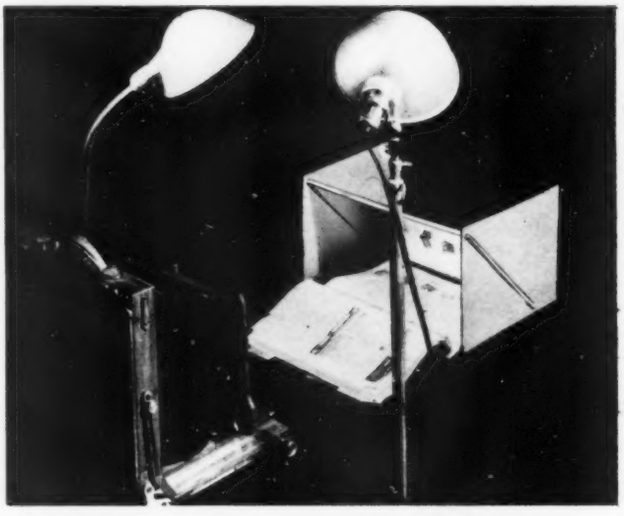
## by ROBERT W. BROWN

**Copies that are not reversed from left to right can be made in a single operation on paper with the camera.**

IT is easy to make direct copies of magazine articles, formulas, pages of books, and other printed matter. Here is a simple method that can be used by anyone who has a camera with groundglass focusing. It produces direct copies, not reversed left and right, in one operation.

Three main items of equipment are essential—a camera with groundglass focusing, a pair of lights in reflectors, and a mirror in a box-like stand that holds it at an angle of 45 degrees to the table upon which the original material is placed. The accompanying photograph shows how the setup is arranged.

While an 8 x 10 camera is best for this type of work, any size outfit will do. The copies are made directly on paper, which is loaded into the filmholders, and hence big reproductions can be made conveniently only with a large camera. However, if the originals to be copied are not too big, any 3¼ x 4¼ or larger camera will be quite satisfactory. In extreme cases, where great reduction cannot be avoided, the copies can be read with a magnifying glass.



Cardboard frame holds mirror at an angle of 45 degrees to the table upon which original to be copied is placed.

The heart of this method is the mirror, which should be slightly larger than the biggest page you want to copy. It is mounted in a box which holds it firmly at an angle of 45 degrees to the table. For a temporary arrangement, you can cut two pieces of cardboard as shown in the illustration to make this support. The mirror reverses the image of the printed matter, so that it reads correctly from left to right when it is reversed again by the camera lens. It also makes it convenient to manipulate the camera in a horizontal position while the material being copied lies flat on the table.

The camera is fastened to a tripod or mounted on a block of wood that will place it at the right height above the table. Two floodlamps in reflectors are arranged to light the copy, one on each side of the camera. The copy is placed flat on the table, with the mirror above it. Keep the copy flat, or straight lines in the original will become curved in the reproduction. The mirror picks up the image of the original and reflects it directly into the camera lens.

By loading your holders with bromide paper, you can get direct copies that are correct left and right, but reversed in black-and-white. When positive prints are needed, they can be made by contact printing, using the original as a negative and printing through the back of it.

Exposure is determined by test strip, but once you get a standard exposure for your own setup you can duplicate the results at any time. As a guide to proper exposure, good results are obtained on No. 4 Velour Black paper when the copy is lighted by two No. 1 Photoflood bulbs in reflectors at a distance of 2 feet and the exposure is 20 seconds at *f* 11.

Development is handled the same way as in ordinary work, although you can get better results with some types of material by using a more contrasty developer. If the letters become slightly veiled with gray, you can make them clear and white by reducing the whole print for a few seconds in Farmer's reducer. This method produces good copies easily, and it gives standardized results. All copies are the same size, and thus can be filed or bound very efficiently.

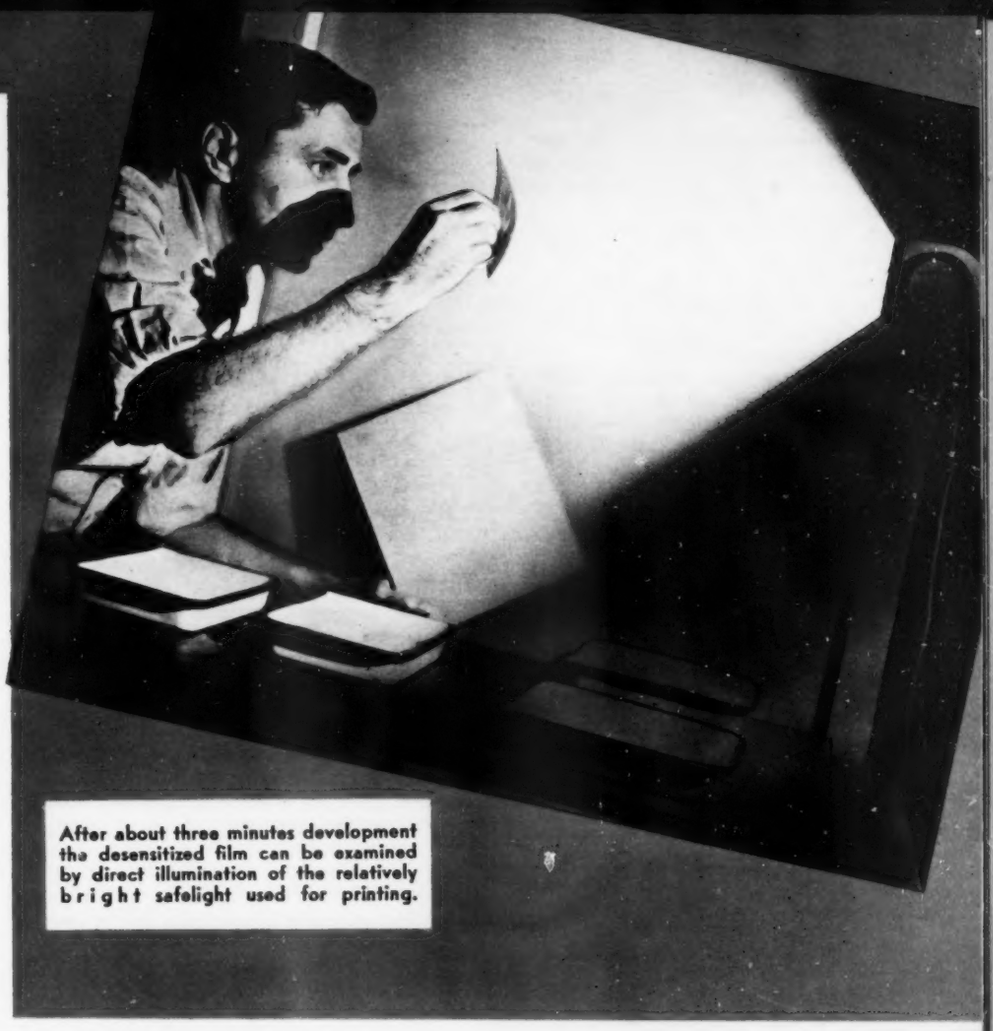
You might like to try this method of copying by using, instead of fast bromide paper, a slower-speed direct positive paper. This paper is first developed to a negative, and then chemically reversed to produce a positive. Thus your copies will be just like the originals and not reversed in black-and-white. Remember that this paper is slower than the fast bromide emulsions, and will require a somewhat longer exposure. Process the direct positive paper according to the manufacturer's recommendations.—

# SEE YOUR FILMS DEVELOP

## by JACK SPALDING

**You don't have to process panchromatic films in total darkness. By desensitizing them first you can inspect the negatives periodically during their development.**





After about three minutes development the desensitized film can be examined by direct illumination of the relatively bright safelight used for printing.

MOST of us process our films by the time-and-temperature method. This means that each exposure, regardless of subject matter, gets the same treatment. We often wish that the work could be done under a light which was bright enough so that we could see what was "coming up" on the film. Well, it can be done—by desensitizing.

Can you remember how often you have waited impatiently and fearfully for a roll or pack to finish developing so you could see what happened to those two or three important shots? Perhaps they were underexposed and should have been developed a little longer than the others. There is really no way to control the development of individual shots, especially on roll film, unless they can be inspected *after* the images begin to appear and before they are fixed.

Inspection under safe lighting conditions is the answer. If you use orthochromatic film, the red safelight is bright enough and relatively safe. But with panchromatic film, which should be processed in total darkness and inspected briefly under a very dark green light, the average amateur would have a difficult time. By desensitizing his films before development, however, they can be examined during processing under the comparatively bright illumination of a Wratten OA (greenish-yellow) safelight, the same one used when making bromide enlargements.

The exposed film is first immersed in a desensitizing bath in total darkness, left there for a minute or two, rinsed, and then transferred to the developer. After two or three minutes the safelight can be turned on and the film inspected. The developer tray is preferably covered with a cardboard to prevent useless exposure to the light during the periods between inspections. The card can be removed occasionally and the film held up to the light. In the case of roll film, those exposures that require longer development can be cut from the strip with a scissors, while the others are transferred to the hypo. The single negatives, being inclined to curl, should be weighted down with clips or held firmly with the fingers while rocking the tray.

A satisfactory arrangement is to use four trays containing, in order, the desensitizer, clear water for a rinse, the developer, and the hypo. They should be arranged in some convenient order, and so that the developer tray is not directly under the safelight.

The tray method, incidentally, is the most convenient for differential development of roll film as some tank reels cannot be reloaded with wet film.

With individual sheet film, the matter is very simple, even when developing a full dozen in the tank at one time. Simply finger over the film edges and pull them out for inspection as desired, placing some in the hypo when ready and leaving others in the developer for the necessary additional time.

The search for a means of desensitizing exposed film to permit inspection in reasonably bright illumination led many

(*Continued on page* 88)

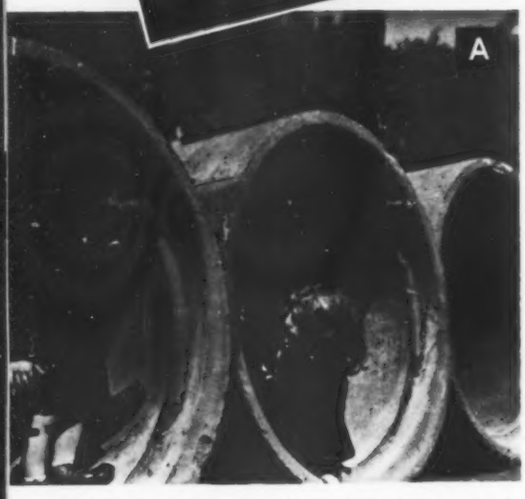
Individual negatives can be cut from a partially processed roll for differential development.

The developer tray is covered with a piece of cardboard during the intervals between inspections to prevent useless exposure to the light.

# More Film Speed

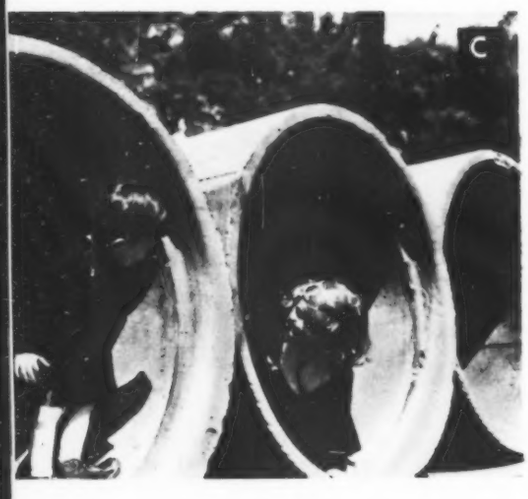
by H. A. MILLER
Kodak Research Laboratories, Rochester, N. Y.

**Modern emulsions are fast, but there are effective methods of getting a little more speed when it is needed.**




Print from an underexposed negative which was made on Eastman Super-XX film developed in D-76. The general quality is poor, with no shadow details.

Pictures B and C were made on the same film and given the same exposure and development as A. Both were exposed for 45 minutes to a Wratten 3 green safelight, B before and C after exposure in the camera. C shows greater increase in shadow detail.




SPEED and more speed is the demand of the camera fan, and manufacturers vie with each other to produce the fastest films. For years photographers have resorted to hypersensitization as a means of speeding up emulsions, with varying degrees of success.

The term "hypersensitizing" in its broadest sense includes any treatment of the film, after it leaves the manufacturer and before it is developed, which will increase the emulsion speed. There are various procedures, one of which employs no chemicals or solution and is simple enough for the beginning amateur yet effective enough to be adopted by the advanced worker or professional.

This article is intended to evaluate the merits and shortcomings of various hypersensitizing procedures, to warn against their indiscriminate use, and to point out the conditions under which they can be successfully employed and just how much benefit can be expected.

To begin with, the photographer can assure himself that the emulsion speed of any of the modern high-speed materials is just about as high as is practicable. In the early days of panchromatic films, the process of manufacture did not carry to the limit the ripening (heating) process which speeds up the emulsion. Subsequent hypersensitization therefore resulted in relatively great speed increases. Today, however, ripening is usually carried to the limit, so that one cannot expect any sensational gains in film speed from after-treatments.

### Chemical Hypersensitizing Baths

The commonest chemical hypersensitizing baths are dilute solutions of borax, ammonia, ammonium carbonate, or of organic alkalies like triethanolamine. A typical procedure for using such a bath is as follows: Bathe the film before exposure in a 4 per cent solution of the 28% ammonia water for 1 to 4 minutes at 55° F. Then carefully squeegee excess solution from the film with a viscose sponge and dry as quickly as possible at normal temperatures. The hypersensitizing bath is used at 55° F. to prevent the swelling of the emulsion during treatment and thus insure more rapid drying. The film must be dried quickly, and should be used as soon after treatment as possible in order to insure maximum effectiveness.

If it is necessary to keep the hypersensitized film for any length of time before exposure, it should be placed in a can and sealed with tape, and stored in a refrigerator. When required for exposure, it should be removed from the refrigerator long enough beforehand to permit it to reach the normal room temperature before opening the can in order to avoid the condensation of moisture on the cold film. It is usually necessary to determine by trial the proper time of treatment and concentration of hypersensitizing agent for the particular type of film used. As a general rule the conditions of treatment which produce about three times the normal fog with customary development—give about the maximum increase in film speed.

All methods of hypersensitizing by immersion in baths have several common faults. They require as much or more handling of the film during hypersensitizing treatment as in the subsequent development. With filmpacks and roll film the paper backing must be removed and then replaced before camera exposure. Cut sheet films or plates are better adapted to this method, but the possible loss of antihalation backing in the prebath must be considered. Also, it is difficult to avoid dirt specks and scratches in handling the unexposed film, and a mottled, streaky appearance is common unless the squeegeeing is done carefully and skillfully.

Some of these objections are overcome by hypersensitizing after exposure when the film is developed directly after the treatment and it is not necessary to rewind the film for camera exposure.

Although gains in speed have been demonstrated by the use of chemical hypersensitizing baths, the method is not recommended for casual use. The optimum composition and concentration of the solution and time and temperature of operation are critical, and vary with the emulsion used. Except where preliminary tests can be made to determine the best treatment conditions for a given emulsion and precise laboratory control can be maintained to reproduce these conditions exactly, it will be difficult to get satisfactory routine results.

### Mercury Vapor Hypersensitizing

A more practical method of hypersensitizing would be one in which the film could be treated with a minimum of handling, and without removing the paper backing or wetting the film. Such

(*Continued on page* 80)

Prints which are incompletely washed and stored under tropical conditions fade rapdily, but can be restored. Part of the picture above (A) was left untreated, while part (B) was bleached and redeveloped. Brown negative stains, resulting in marks on the final print as shown at the right, are caused by fungus growth in tanks. The remedy is to scrub tanks regularly.

# STAINS
## AND HOW TO PREVENT THEM

**by J. I. Crabtree, A. R. P. S.**
Kodak Research Laboratories, Rochester, N. Y.

***These common defects are difficult to get rid of, once they have been produced, but are easy to avoid by observing a few important rules.***

YOU can avoid stains on negatives and prints. They are among the most common defects in photography, but most of them are unnecessary. At least 90 per cent of all stains are the result of faulty manipulation in incorrectly compounded or old solutions, or of storage under unfavorable conditions.

Although the word "stain" is usually associated with something colored, broadly speaking a photographic stain is any deposit foreign to the image which will absorb light. This definition therefore includes not only colored spots, irregular colored markings, and general stain, but also white or colored scum, and dichroic fog.

Many stains are caused by development in solutions that have been mixed incorrectly. It is far cheaper to purchase prepared chemicals, and not overwork them by attempting to process too many negatives or prints. After all, chemicals are cheap in comparison with film and paper.

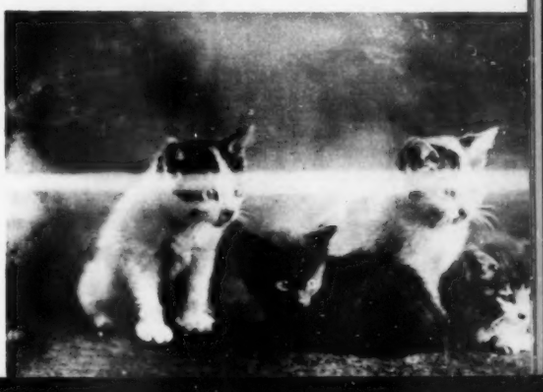
With modern developing solutions, little or no staining trouble should be encountered in the developer. If a film is inadvertently left in the developer for an excessive time, dichroic fog may be produced. This stain consists of a uniform layer of silver which is brownish red when seen through the film and greenish when inspected by reflected light.

If hypo is splashed into a used developer and the developer then is stored and used again at a later date, a somewhat similar silver stain will be formed on the negative. It has a silvery sheen when examined by reflected light. This is known as "silver scum," and can frequently be removed by wiping, after washing and before drying. Later it can usually be removed by bathing the film in a weak solution of potassium cyanide prepared by dissolving 75 grains in 1 quart of water. This chemical is a deadly poison and extreme care should be exercised in its use. This method of removing the stain is based on the fact that the stain is more soluble in the cyanide solution than the silver, comprising the image.

Only one negative should be handled at a time, and the negative should be watched carefully and placed in the wash

(*Continued on page* 84)

A red ink stain on the negative resulted in a light area in the print above. The stain was removed by bleaching and redevelopment, and the treated negative produced the print below.



Negatives stored in envelopes with pasted center seams sometimes develop lines that are caused by moisture the adhesive holds.

Plain areas in the main picture make the best background for the printed-in portion of a composite. No special shape is needed—triangular composition seems best here.

Two pictures of the same person often can be used for an effective composite, one showing action and the other revealing the subject as he lives it over in retrospect.

# PICTURING THOUGHTS

## by HAROLD M. LAMBERT

Photographs by the Author

**This simple method of printing two pictures on one sheet of paper enables you to express ideas that cannot be caught in one exposure.**

THE most interesting pictures are those which tell a story or express an idea, but some of the things we would like to show are too complicated to be crammed into a single exposure. To solve this problem, you can make separate negatives and then combine them in one composite print.

If you want to make a "thought picture," for example, one pict ıre will show the subject in an attitude which suggests thought of some sort. The other reveals what he is thinking about. Almost always the picture of the subject thinking is the one which fills most of the paper, and the other one is printed into it.

All you need to make composites, in addition to your regular enlarging equipment, are a pair of suitable negatives, a simple vignetter mounted on a thin wire, and a piece of cardboard with a hole in the center. You can do a much better job if you rig up a stand to hold the vignetter over the paper, as shown in the accompanying illustration.

You probably have several sets of negatives in your file right now that will serve this purpose. In addition to showing a subject and what he might be thinking about, they must also be of approximately the same degree of contrast. This is important, for you can't get good composites by printing negatives on a single sheet of paper when they really should have different contrast grades.

For the sake of economy, it is a good idea to start out with 5x7 paper. Composites must be enlarged, in order to facilitate double printing, but they need not be big to start. After a few tries, you will be ready to shift to larger paper with less waste.

Attach to your enlarger easel a piece of paper the same size as that of your final print, using cellulose tape or thumbtacks. With developer mixed, hypo and short-stop checked, and vignetter, cardboard, and an empty paper box or envelope at hand, you are ready to start.

Take the first negative—the one of your subject doing the thinking—and place it in the enlarger. Project it onto the sheet of paper on your easel, adjusting the enlarger until you have the composition right. Remember that you want to leave enough room to print in the second negative, and provide plenty of space for it.

Most often this space will be somewhere above the head of the subject, and it should be placed in a section of the negative which can be shaded out without seriously disturbing the original composition. Avoid printing the second neg-

(*Continued on page* 98)

A vignetter on a stand holds back light from a portion of the main picture as it is printed.

Composites of this sort are very suitable for use on Christmas cards. If you happen to have one of the negatives in your file already, it is easy to shoot another picture planned to fit in with it.

It is easy to put across the point of a symbolic picture when you use more than one negative. The composite below tells its story far more clearly than either of its two photographs would alone.

Children are sure-fire subjects for interesting thought pictures, especially of the humorous type. The best place for the portion of the picture showing what the subject is thinking about usually is at the top of the print, over his head.

# DOGBODY'S DARKROOM

## by JOHN ADAM KNIGHT

Camera Editor, New York Post

***Ultra-scientific photography is fine, if you don't let it get you. This is the sad tale of Horace Dogbody—who did.***

At least half of my misspent life has been devoted to cajoling, ridiculing and reviling photographic old-timers who refuse to keep step with the advance of science in our field. Therefore, I should be the last to complain about anyone's being too modern in his practice of photography.

But if you knew my friend, Horace Dogbody, you would agree with me that it is possible to carry this up-to-date stuff too far.

Horace is nineteen years old, a bookworm by nature, and a pest by general agreement of all who know him. He is forever putting me on the spot by turning up at some camera club where I am lecturing and asking me such questions as: "Which is the best method of welding molybdenum steel for photographic processing apparatus—the metallic arc method or the atomic hydrogen arc?"

Or, in the presence of other photographers he will ask: "Let's see now, what was it that refugee physicist, Dr. Plotnikow, said about the attenuation of light in his paper, *Ueber Wärmeschattenphotographie und Longitudinale Lichtstreuung?*"

It is pretty hard for me to continue to appear omniscient in such a situation. And if I pretend not to hear, he repeats the question—but loud.

All this is somewhat beside the point, however. The purpose of this article is to describe Horace's ultramodern darkroom, which is absolutely the last word—I hope.

In one of my weaker moments recently, Dogbody persuaded me to let him demonstrate in his own darkroom how he utilizes the latest discoveries of science in producing photographic enlargements. Stripped of all but the bare outlines, this is the story of that visit.

As I look back now, I remember that I had a sort of premonition of what was to come when a photoelectric cell hook-up outside the door opened a light trap for us to pass through, then turned on the ceiling light, and pulled out a cabinet drawer filled with neatly filed negatives.

At the same time, three spigots opened over the drainboard and trays were filled with the correct quantities of paper developer, acid stop bath, and hypo. I learned later that this caused a thermostat to set in operation a cooling apparatus, bringing the temperature to exactly 68° F.

Horace went right to work. He selected a negative from the file and placed it in the enlarger. As he did so, the ceiling light went out and the enlarger light went on. But such a light!

"Instead of the entire band of an ordinary light source," Horace explained, "I use an argon-mercury-vapor lamp screened with a Corning 986 filter to transmit only ultra-violet rays of 2537 Angstrom. Notice that there is almost no visible light, yet I get a good focusing image because the radiation energizes the fluorescent material I place on the easel when focusing.

"Of course, about 200 times longer exposure is required for enlarging this way, but variations in current, and in color temperature of the lamp as it grows older are entirely eliminated."

I gulped down a couple of aspirin tablets and Horace switched off the enlarger light. As he did so I heard a whirring sound in the darkness behind him, followed by the thud of leather and a groan from Horace.

"What goes on here?" I inquired.

"That was the paper server," my friend replied. "A built-in densitometer beneath the negative slot selects the proper grade of paper and by electrical impulse trips one tumbler in the lock on the paper safe.

"When I adjust the masking bands of the easel for print size, a second tumbler falls.

"Then, when the focusing light is switched off, the remaining tumbler is released and a drawer containing the proper size and grade of paper springs out of the cabinet behind me.

"To help me locate this in the dark I fastened boxing gloves on the front of each drawer. When one of these socks me—over the left kidney, for example—I know exactly where to reach to find the paper.

"At first I had trouble with this arrangement. When I happen to be bending too low as the drawer flies open, the glove swats me on the jaw and knocks me out. I used to lose a lot of time that way. But now when this happens an overhead sprinkler sprays cold water in my face. In no time at all I can go on with my work."

Somehow we got through that long exposure, the paper went into the developer and a deep purple safelight came on. Then the fun began once more. While I knew that Dogbody would never stoop to anything as old-fashioned as rocking trays by hand, I was not prepared for the contraption that he next set in motion.

Instead of rigging up a device to rock the trays, he unloosed a machine that rocked the entire darkroom while the trays remained stationary. Said he got the idea from reading how movie photographers rock the camera instead of the ship to produce the illusion of a storm at sea. I didn't quite follow his reasoning, but by that time I was too seasick to care. That darkroom was rolling like a tugboat in a typhoon.

Each step in the processing brought into play another of Dogbody's super-super gadgets, but I shall not bother to describe them here. By now the reader will have begun to get the general idea, I think. But I must mention that while the customary routines of developing, fixing, and washing were followed, no image ever came up. The paper remained a virgin white. I remember calling this to Horace's attention several times. Each time he assured me, mysteriously, that everything was all right.

Finally the print was taken from the wash and placed in a huge and sinister looking dryer, and Horace threw a switch to turn on the heat. But instead, out of the depths of the contrivance came a nasal voice singing "My Time Is Your Time."

"Oops!" exclaimed Horace, "Rudy Vallee. Must be a short circuit with the radio."

This was soon repaired, and finally the print came out of the dryer, complete in every detail except that there was no visual image—just a plain white sheet of paper.

"Now," said Horace, "you will see something you never saw before."

On one wall was a sort of overgrown medicine cabinet with eyepieces like those of a pair of binoculars protruding from the front. Horace opened this cabinet and placed the paper in a frame at its rear, entirely surrounded by neon-

(*Continued on page* 91)

# Salon Section

S. O. S.

by LESLIE AYLOR

SEA LURE.....by Alex J. Cattanach, New York, N. Y.

MENDING NETS.....by Carola Gregor, New York, N. Y.

# FISHERMEN

THE interesting paraphernalia of men who take their living from the sea gives a salty tang to pictures. Rigging against the sky, and nets hung up for mending are among the things that create sea atmosphere.

(For Technical Data see page 72)

# CONVOY

WARFARE produces many dramatic scenes that should be preserved in history, and often there are Army cameramen on hand to record them. These Signal Corps pictures were taken by Larry Williams, en route to Ireland with a troop convoy.

(For Technical Data see page 72)

# STILL LIFE

COMPOSITION is especially important in still life. Any subject matter can be used, as long as it is arranged to form a pleasing pattern and lighted to bring out its best features.

(For Technical Data see page 72)

MEXICAN BOTTLE.....by
Leslie L. Johnson, Dayton, Ohio

HAWAIIAN COCOANUTS..by
Henry Inn, Honolulu, T. H.

# MECHANICS

INSTRUCTION is a good keynote for father-and-son pictures. Show them in a typical pose, with father demonstrating anything from turning metal on a lathe to running a toy steamshovel.

(For Technical Data see page 72)

EXPERIENCE...by Howard Hoadley, Findlay, Ohio

SHOVELERS..by H. Armstrong Roberts, Philadelphia, Pa.

THRESHING

# CLOUDS

OUTDOOR scenes are much more interesting if there are clouds in the sky. These photographs by H. V. Lyle show how they create a mood in a picture, whether it is the peace of a calm summer day or the threat of a coming storm.

THREATENING SKY

KANSAS HARVEST

OIL FIELD

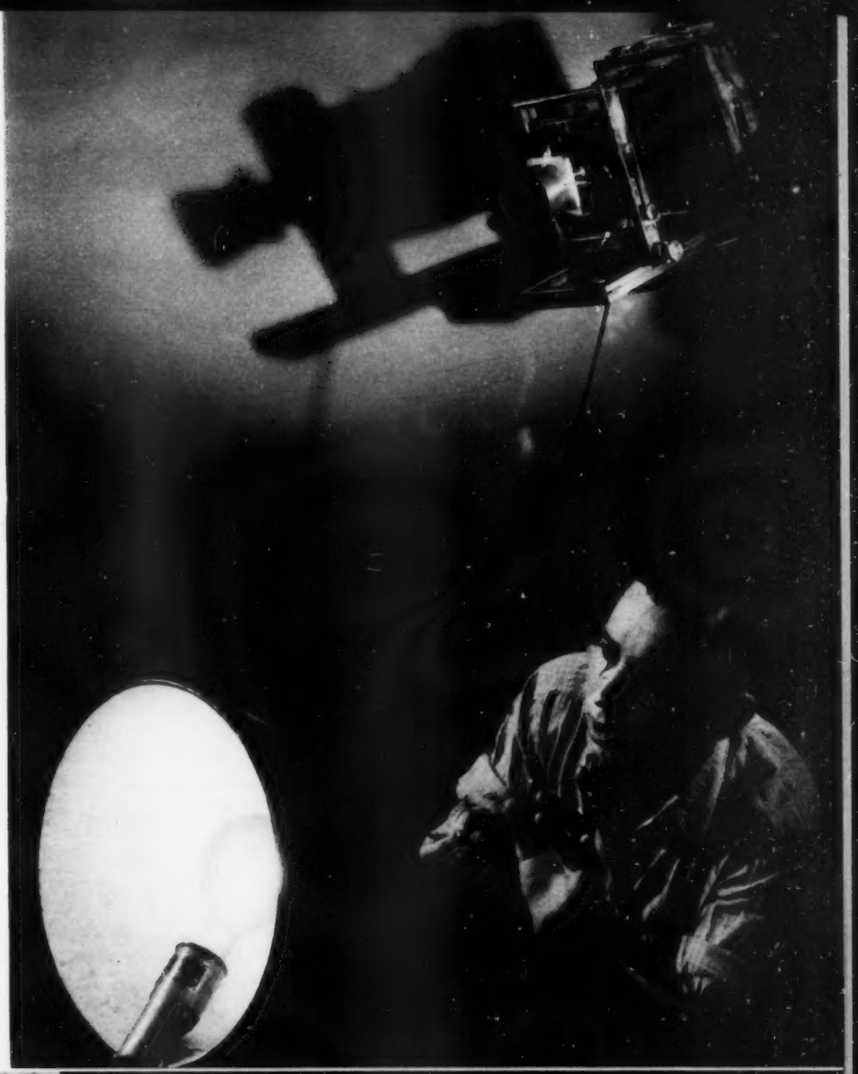
STUDY

by PAUL HEISMANN

# READY

PHOTOGRAPHERS themselves are seldom pictured, in spite of the fact that they are good subjects. Whether you make candid shots or carefully posed pictures, be sure to show them engrossed in their work.

(For Technical Data see page 72)



PHOTOGRAPHER AT WORK. .by
Zia Qadri, Los Angeles, Calif.

FRED ARCHER.....by
Frank Ubhaus, Los Angeles, Calif.

INFERNO..by George M. Johnson, Whiting, Ind.

CENTENARIAN..by Newton Hartman, Philadelphia, Pa.

# SMOKE

WHETHER you photograph a conflagration or a man with a cigar, bringing out the smoke will dramatize your picture. A fire may provide lighting of its own, but the illumination of cigar smoke must be planned.

(For Technical Data see page 72)

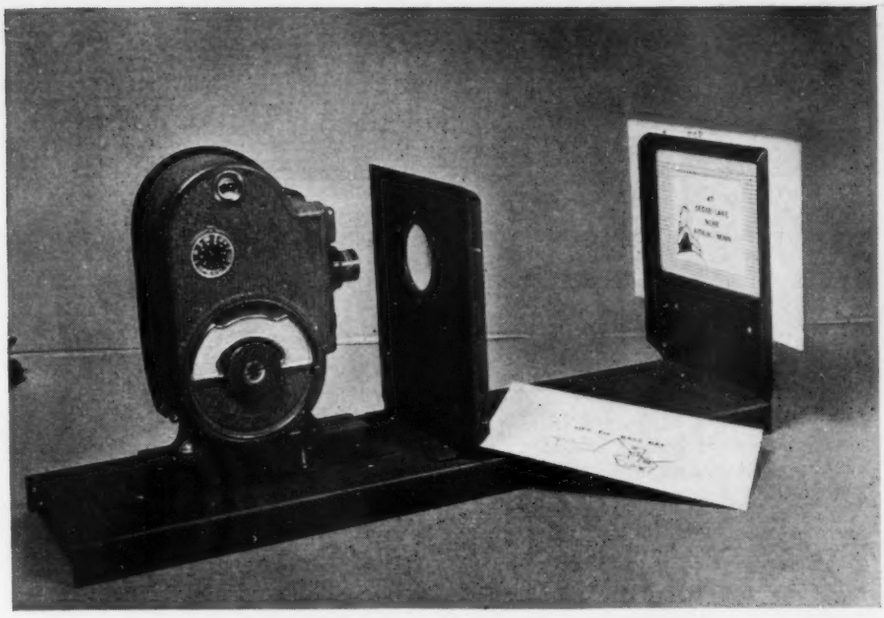
# FIRST AID

MISHAPS, if they are not too serious, can set the stage for photographs rich in human interest. There is just enough gravity to tell the story in these two examples, both photographed by H. Armstrong Roberts.

(For Technical Data see page 72)

SEA FOAM

by FRITZ HENLE



In positive titling, white cards with black letters are set up and photographed. The film is exposed as usual, and developed as a negative to get white lettering on black.

# MOVIE TITLING WITH POSITIVE FILM

*by George Carlson*

**It is easy to make your own movie titles when you use this simple method. The whole job can be done at home, with little special equipment.**

THERE are many advantages in using positive film for movie titling. In the first place, it can be developed at home by any amateur. It is inexpensive, and has a contrasty emulsion which produces clearer white areas and more opaque black areas than the regular reversal film. Its speed is slow, but this is overcome by using floodlamps and placing them close to the titling board.

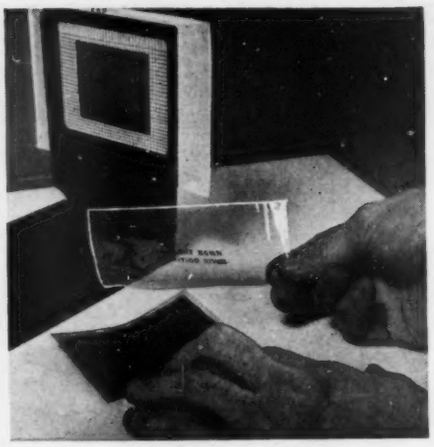
Positive film is developed as a negative and not reversed. This makes it possible to letter a white title card with black ink and get white lettering on a black background in the final film. It is much easier to do this than to letter with white on black paper, as reversal film requires.

The film is easily handled by the light of a ruby or an orange-green safelight, such as is used in enlarging. This enables you to see what you are doing all through development, and also in winding back film for making double exposures in the camera and for other experimenting.

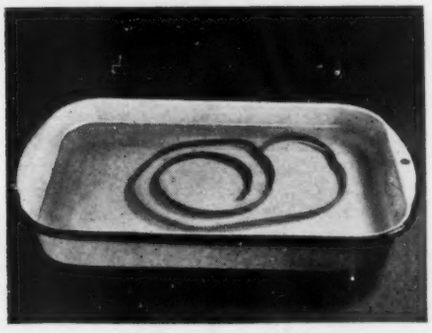
The main thing to remember in making positive titles is that after development the values are reversed. Light areas on the title card will be dark in the finished title, and dark ones will be light. The cards can be lettered with black India ink, or on larger cards, black letters cut from spare album leaves can be used, as well as letters from the regular titling sets on the market. When using small titlers and typewritten cards, a good stunt to get clear black letters is to set the machine on "stencil" and type through a fresh sheet of black carbon paper onto the white card. It is not absolutely necessary to use a white background. Various light shades of paper or cloth can be used, such as sheets from an old wallpaper sample book. The color must be light enough to furnish sufficient contrast for the black letters. In this case, the finished title will show a grayish background. Results are especially good when a rough-textured paper or cloth is used.

Photographic backgrounds can also be used with direct positive titles. In this case the photograph should have a negative image. This can be obtained by printing direct from the picture onto a piece of contact or enlarging paper, us-

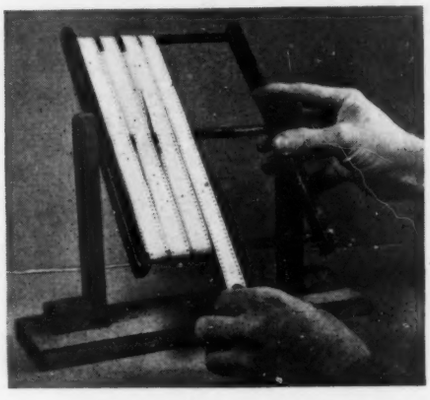
(*Continued on page 96*)



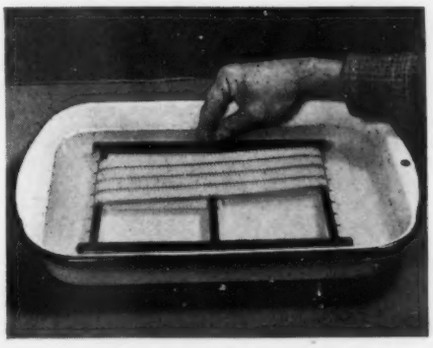
For a scenic background, black lettering on cellophane is placed over a negative of the scene and illuminated from behind.



Short lengths of film can be developed by placing them on edge in a tray, working in the light of an ordinary red safelight.



A quantity of film is best handled on a rack, which is easily made at home. The film is loaded with emulsion side out.



Pins keep the coils of film separated on the rack, which is protected from solutions by a thorough coating of melted paraffin.

# DARKROOM KINKS

## by JOEL GRAYSON

***Here are tips on how to get the most out of your photographic equipment and materials in wartime.***

THERE are dozens of ways you can save in the darkroom, by taking good care of equipment to avoid the need for replacement and by improvising useful articles made of waste materials. Wartime scarcity makes these things more important than ever, and the photographer who keeps his equipment in shape and makes use of all materials at hand is the one who will be able to keep on turning out pictures for the duration.

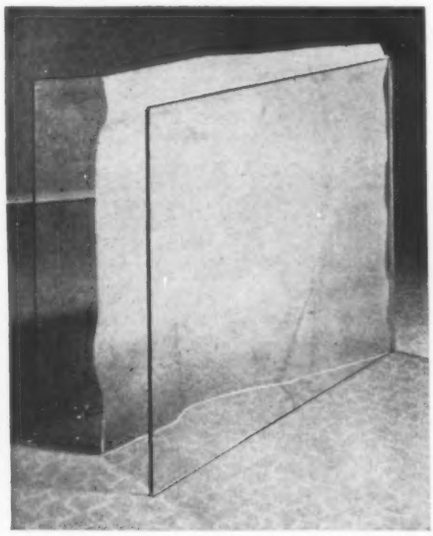
Some methods of working call for mechanical aids that are not available on the market, and must be made by the amateur. Bits of cardboard, black paper, empty boxes, old bottles, and many other articles of little real value will serve well in countless places around the darkroom.

Most familiar are the use of cardboard for dodging under the enlarger, and of sheets of black paper for making negative masks. Other uses for these and miscellaneous materials often thrown away are offered in the accompanying illustrations. Don't stop at the ideas you find here—use them as a starting point, and develop similar ones of your own when the occasion arises.

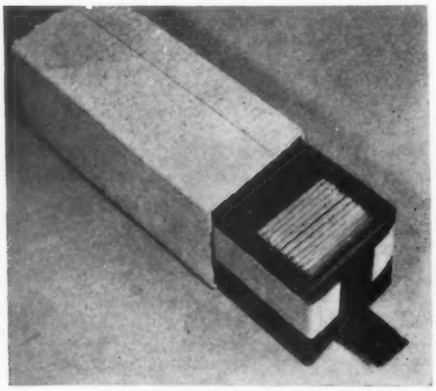
Photographic equipment requires care if it is to last, and a periodic checkup should be made to make sure everything is in good working order. For example, if the enlarger head does not slide up and down the upright as smoothly as you would like, wipe the column with a soft cloth moistened with a few drops of light oil. Dust out the bellows, keep the lens clean, and oil the focusing mechanism. This will help you get better prints, as well as prolong the life of your equipment.

Some items should be saved and returned to the manufacturer through your camera dealer. Film spools and packs come in this classification. Tin cans should be turned in for de-tinning where collection agencies have been set up. Tinfoil is useful for coating reflectors, but otherwise also should be turned in.

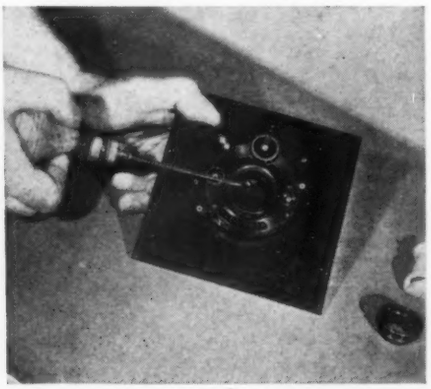
Keep an eye open for different ways of maintaining your equipment in good working order, and of making use of materials ordinarily wasted. In addition to getting more service out of the things you now have, you can make better pictures with everything in good shape and with a few home-made gadgets on hand when you need them.—



The red paper used in wrapping film can be employed in a safelight by mounting it between two sheets of glass, with tape.

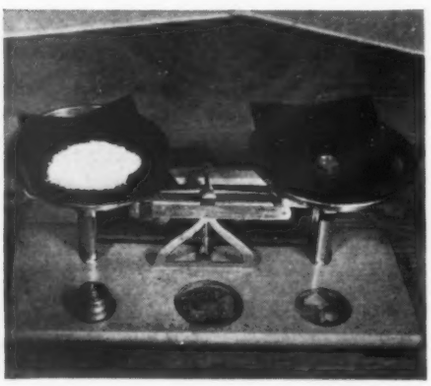


A handy slide file can be made of an old corrugated pasteboard carton, cut down as needed and taped together at the seams.

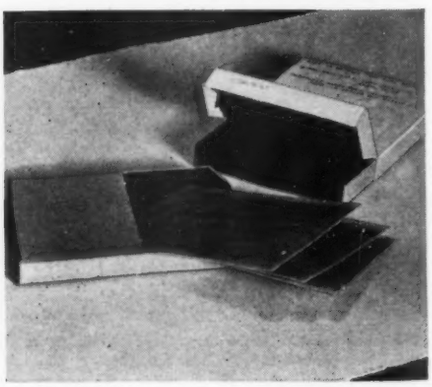


To get long service from lens and shutter, keep them clean. A syringe is the best means of blowing out particles of dust.

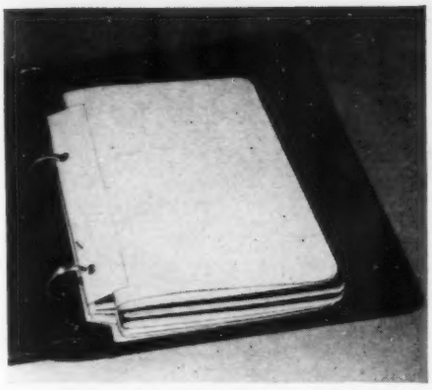
The black paper that comes in packages of film is useful for cutting negative masks. Use a razor blade to get a straight edge.



Film separating sheets are handy to hold chemicals in weighing. Place one on each pan. They keep pans and chemicals clean.

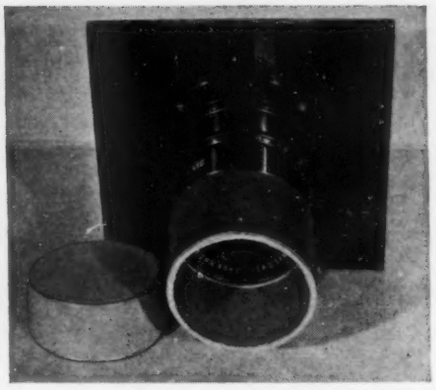


Old film boxes can be converted into fine negative files. About nine films can be placed in each one, in glassine envelopes.



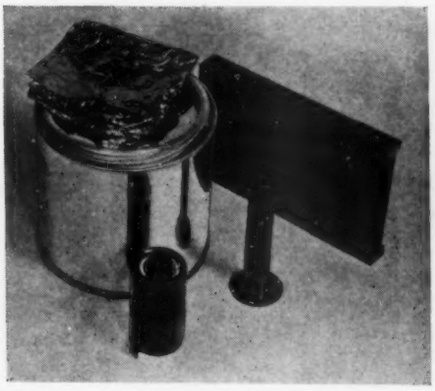
An inexpensive ring binder is useful for keeping booklets at hand. Gummed index tabs, punched, make a suitable binding.

Protect your lenses to make them last. A leather or cloth case will keep out dust and moisture while they are not in use.

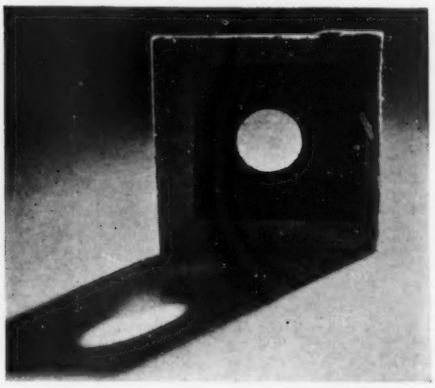


Tubular containers of cardboard often can be used as lens hoods. Make sure they are not so long that they cut image corners.

Don't throw away the bottles in which you buy chemicals and solutions. They can be put to many uses in your own darkroom.

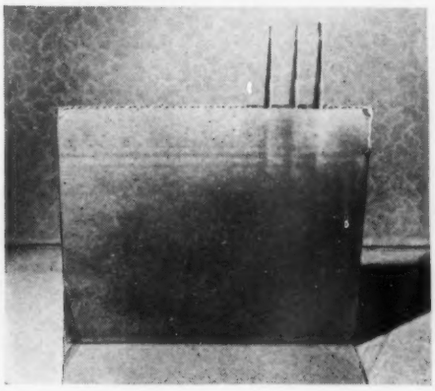


Save spools, packs, foil, and tin cans. Manufacturers need spools and packs, and cans and foil are used in war production.

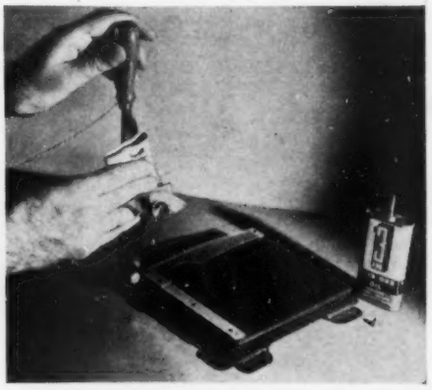


Ordinary corrugated cardboard, lined with black paper, can be used for lensboards to mount experimental lenses in your camera.

Cracked trays are not a total loss. Seal up the cracks with liquid enamel, which is available at most photographic stores.

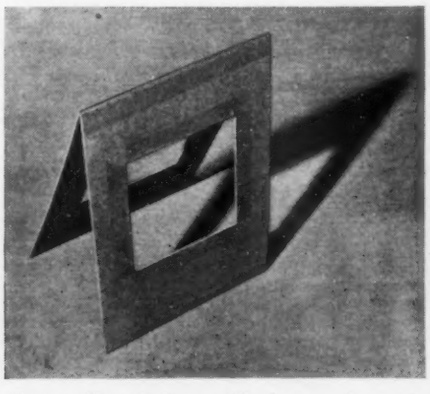


Spotting brushes are easily lost if they don't have a special place. Corrugated cardboard makes a very efficient holder.

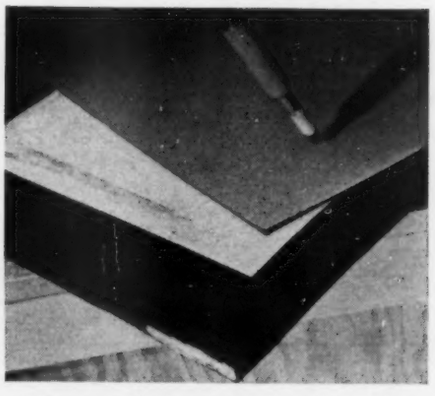


To protect the metal parts of your photo equipment, wipe them down with a cloth that has been moistened with light oil.

Condenser units of enlargers gather dust that results in muddy prints. Brush them off regularly, and polish with a chamois.



Two cardboards from a film box can be used to make a glassless negative holder. They are hinged together with cellulose tape.



Discarded 16x20 mounts, bound together with tape, make a safe base for trimming prints without damaging table surfaces.

# Copying with the Enlarger

**by JACOB DESCHIN, A.R.P.S.**

**Every enlarger is potentially a camera. All you have to do to convert it for copy work is take off the lamphouse and substitute an adapter to take groundglass and filmholders.**

The enlarger-camera is ideal for copying. Its stand is made to order for raising and lowering above the original, and the focusing mechanism is easily adjusted.

ANY enlarger can be used to take pictures, if you rig up a groundglass for focusing and a fog-proof holder for the film. Because of its sturdy support, ease of raising and lowering, and convenient focusing mechanism, the enlarger makes an ideal copying camera. It also is suitable for making extreme closeups, and for photographing small tabletop setups.

The principle of the enlarger is the same as that of the camera. Recently several manufacturers thought it time to take advantage of this, and began making special accessories for converting their enlargers into cameras. Among these convertible outfits are the Simmon Super Omegas, the Kodak Precision, the Graflex Variograph, the DeJur-Amsco Versatile, the Burke & James Solar, and certain models of the Federal line.

For copy work, an enlarger affords most of the features that must be provided in arranging a setup with a camera. The planes of the lens, negative, and easel are perfectly parallel. It is easy to raise and lower the "camera" above the easel. Focusing adjustments are provided, within just the range that is needed most. The masking bands of the easel form a convenient holder for the material being copied.

The same general principles underlie the several commercial devices offered to adapt enlargers for picture taking. Since the enlarger-camera is to be focused visually, the head or housing must be removable to permit studying the image on a groundglass. Condensers or regular groundglass diffuser must be taken out.

Next comes the provision for focusing. This could be accomplished merely by placing a sheet of groundglass over the opening where the negative holder normally lies. The hitch comes in replacing the groundglass with the film upon which the exposure is to be made—both must lie in exactly the same plane. Some sort of platform is therefore supplied. The groundglass is placed in it for focusing, and then the filmholder replaces it for the exposure. A catch holds the filmholder in place while the sheath is withdrawn.

The enlarging lens has no shutter. Consequently, it must be covered with a lens cap or piece of cardboard until ready to make the exposure. At the end of the exposure the lens is capped again, and the film sheath replaced in the holder. If a small stop and slow film are used (there is no advantage in using fast emulsions in this work) the lights can be turned on and off for the exposure. The normal room lighting will have little effect, particularly if you shield the lens and easel with your body while the film sheath is out.

Another *must* of the convertible enlarging camera, if you want to use it

The first step in converting an enlarger for copying work is to remove the lamphouse. With most models, this is easy.

Condenser lenses, if any, are taken out and carefully put away to avoid damage. The next step is to insert the adapter.

With adapter in the former position of the negative carrier, you can insert the focusing panel or a standard filmholder.

for anything but copies, is that the head must permit swinging off vertical to any desired angle. The locking device must be secure enough to keep this angle fixed.

Enlargers for which custom-made camera adapters are not available can be fitted to take pictures by employing home-made accessories. The only essential is a removable lamp housing, although a swinging enlarger head is a big help if you plan on doing anything but straight copy work.

The simplest possible enlarger copying method is one used by a friend of mine, who says it does the trick for him every time. He takes any negative that happens to be handy, and projects it onto the easel to get a sharp image slightly larger than the print to be copied. After focusing carefully, he switches off the enlarger light and puts his original print in place on the easel.

Then he arranges a pair of lights to illuminate it evenly, and switches them off. In total darkness, he removes the negative from the enlarger and replaces it with a piece of sheet film. Then he wraps a length of black cloth around the negative carrier of the enlarger to keep out stray light, and makes his exposure by turning on the lights for the required time. The negative then is removed and developed as usual.

This is an easy method to use for an occasional copy, but there is danger of fog, and the whole system is not as reliable as using an adapter, groundglass, and standard filmholders. If you build your own adapter, you can work by regular light, you don't have to worry about fogging, and you can make a number of shots in succession as easily as you would in operating an ordinary camera.

A good adapter should have a properly centered opening of the right dimensions for your film, a suitable, reliable recess in the opening to hold first the groundglass and then the filmholder—both in the same plane—and a lightproof bed.

The simplest approach to an efficient adapter design is to use the negative holder as the starting point. If you make your adapter on substantially the same lines as the negative holder, with the necessary changes required to make it light-tight, you should have no difficulty in turning out an efficient gadget. To prove how easy it is to do so, I made such a device for my enlarger to illustrate this article.

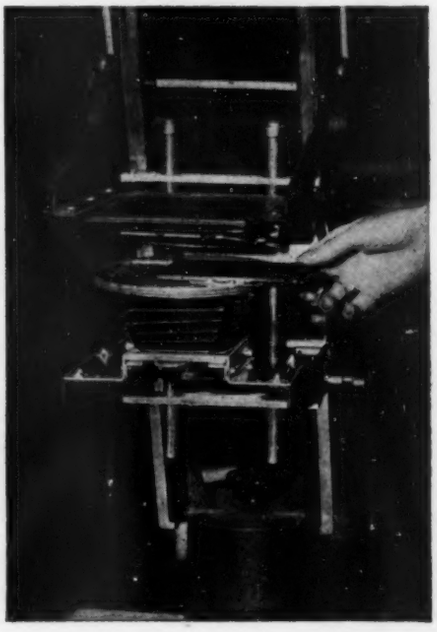
Heavy cardboard, about ⅛″ thick, was used practically throughout, with somewhat thinner cardboard for the grooves. My first step was to measure the negative holder, which was exactly 4 by 5 inches and fitted accurately against pins on the negative platform. With a very sharp, pointed knife, I cut a 4 by 5″ piece out of a sheet of ⅛″ cardboard. Then, superimposing one-half of the negative holder over the cardboard, all edges flush, I traced an outline of the negative opening on the cardboard, then enlarged the opening by extending the lines ⅛″ all around. This was done because the filmholder to be used would itself provide proper masking. It was then a simple matter to cut this opening in the cardboard.

As I planned to use the groundglass back and filmholders of my 2¼ by 3¼ camera in the adapter, I lined up the adapter opening with the filmholder and provided for a stop at one end of the adapter. This came to 5/16″ wide. I cut two strips of ⅛″ cardboard 4″ long and fastened the two together with rubber cement, attaching the double strip to the end of the adapter in the same way.

Probably the most useful phase of the enlarger-camera tie-up is the convenience it affords for making copies and extreme closeups. Of particular value to many is the fact that the enlarger thus gives them the use of an extra camera, limited though it is. It also permits the fellows who have only rollfilm cameras, to avail themselves of the wide variety of sheet films for special or experimental purposes, plus the convenience of shooting one or two exposures and developing them then and there without waiting for a whole roll to be used up.—

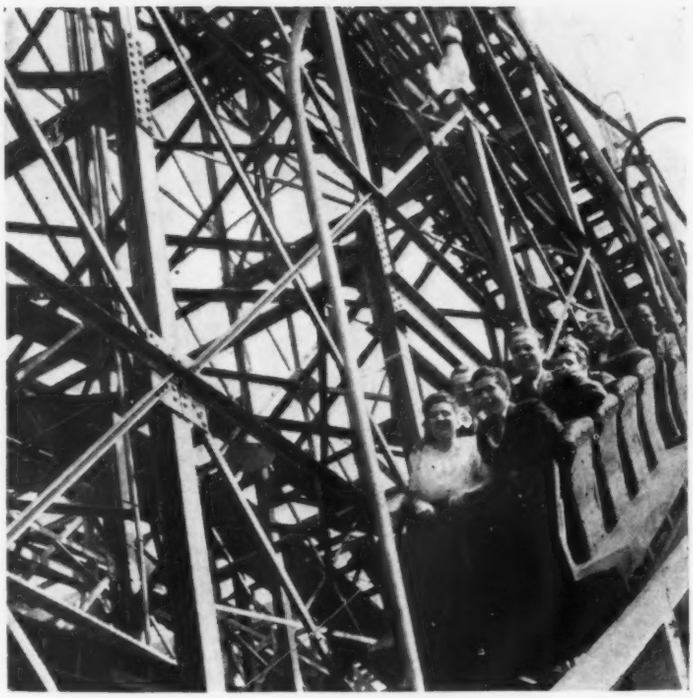
Sheets of cardboard were glued together to make this adapter. Note the grooves into which the filmholder is inserted.

Ready-made adapters can be purchased for some enlargers.. Although made of metal, they are somewhat similar to the cardboard one the author built.



Leonard S. Rubin of Bronx, N. Y., used a Rolleicord to take this interesting shot. It required an exposure of 1/100 second at *f* 5.6.

This circus girl's portrait was snapped by O. S. Bennett of New Britain, Conn., with a Rolleiflex. His exposure was 1/100 second at *f* 11.



First star for October goes to Edward A. Hamburger of New York, N. Y., for this action picture, taken at Coney Island. It was made with a Kodak Monitor on Eastman Plus-X film. His exposure, in bright sunlight, was 1/400 second at *f* 8. The car was about 25 feet away.

This fast action was caught by Max W. Hunn of Moline, Ill., with an exposure of 1/400 second at *f* 11 on Agfa Supreme.

# PICTURES FROM OUR READERS

This sunset silhouette was taken by Paul Hadley of Piggott, Ark., who used a 5x7 view camera. His exposure was 1/100 second, stopped down to *f* 22, on Agfa Superpan Press film.

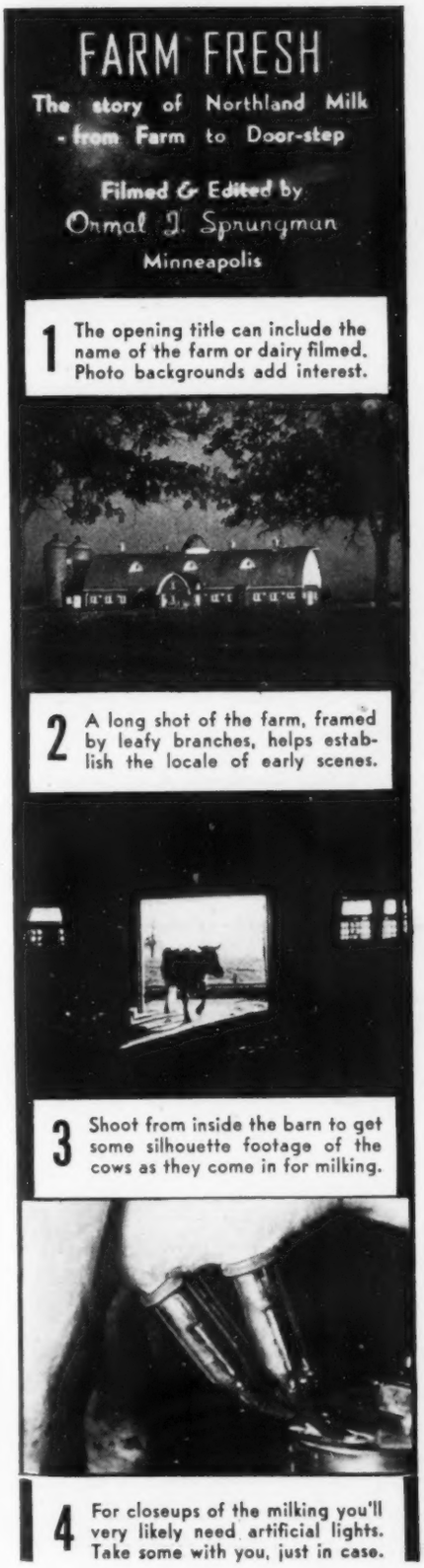
Leon C. Holand, Jr., of Monroe, La., caught this fire scene with a 4x5 Speed Graphic. He took the picture with an exposure of 1/50 second at *f* 16 on Eastman Panchro-Press film.

This outdoor portrait takes second star for October. It was made by Carroll E. Bradberry of Stanford U., Calif., with a 35 mm Perfex 55 camera. The exposure, on Agfa Finopan film, was 1/50 second at *f* 8, with a green filter to darken the sky.

# FILMING MILK . . . from Cow to Kitchen

## by ORMAL SPRUNGMAN

**Here's a subject that's "close to home" wherever you live. And it's a natural for as much story-telling footage as you can shoot.**




**1** The opening title can include the name of the farm or dairy filmed. Photo backgrounds add interest.



**2** A long shot of the farm, framed by leafy branches, helps establish the locale of early scenes.

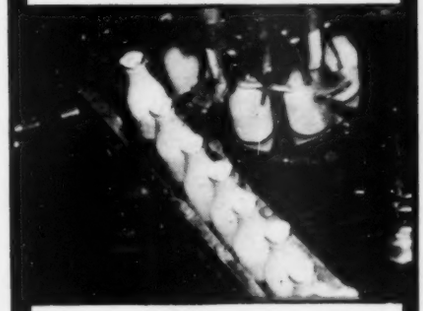


**3** Shoot from inside the barn to get some silhouette footage of the cows as they come in for milking.

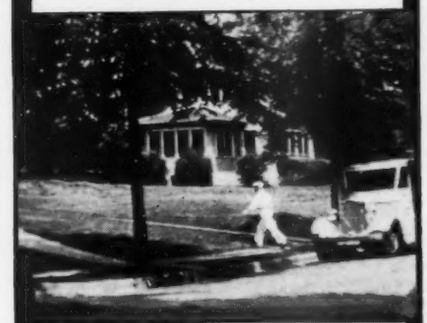


**4** For closeups of the milking you'll very likely need artificial lights. Take some with you, just in case.

**5** Scenes taken in a bottling-plant are always interesting. Here the milk is being emptied into a vat.



**6** Look for angle shots around the machinery which fills and caps the familiar bottles for delivery.



**7** The milkman's daily routine should be given thorough coverage. He'll probably cooperate wholeheartedly.

**8** The consumer test is the climax of your whole story. Children can put a lot of fun into a scene like this.

WHILE you may never have considered it before, there's a fascinating movie story for you in the familiar bottle of milk you pick up from the doorstep every day.

You can have a lot of fun putting together a film story of milk, no matter how simple or how elaborate your script may be. And the resulting feature will appeal to nearly everybody.

The scenario can be as brief or as lengthy as you want to make it. You can, for example, merely show the approach of the milkman, his trip to your back door, the taking-in of the full bottles by some member of the family, and the use of some of the milk for breakfast. Even a simple group of sequences like this can be interesting when handled with ingenuity.

It's all the better, of course, if you can do a more detailed job. Perhaps the milk company will let you film some sequences inside the bottling plant. And if you can arrange for a dairy farmer to let you wander around the premises with your movie camera, you can go into the subject even more thoroughly, tracing the milk from farm to consumer.

Regardless of how simple or how detailed you plan to make the film, you might start off with a long shot of a sleeping city or town early in the morning. Then you can come in for closer shots of empty streets, finally showing your home.

A milk wagon or truck pulls up to the curb, the driver jumps out and hurries up the walk to the back door. Next, shoot a closeup of his hand replacing empty bottles with full ones, then shift to another close shot of the milkman's feet as he hurries back down the walk. If you want to, you can trace the milkman's progress briefly, showing him making other deliveries, occasionally stopping to pat the head of a familiar dog or to greet some acquaintance who is on the way to work.

Then you come back to the doorstep on which the milk has been left. The first rays of the sun have crept into a corner, where a screen door opens. A pair of slippered feet is shown beside the bottle, and a hand reaches down to take the milk into the house.

In shooting this early-morning footage, you'll probably have to use the widest lens aperture at your disposal. If even this isn't sufficient to produce good exposure, you can do a pretty good job in black-and-white by shooting in full daylight and deliberately underexposing.

After the bottles have been taken into the house, show the part milk plays in everyday life. A series of rapid dissolves

(*Continued on page* 78)

# TRADE NOTES AND NEWS

RECENTLY announced is the Holsons photo album, which features a new method of mounting prints. Snapshots fit into slots, and can be removed or shifted at will; no adhesives need be used. This new album

**No adhesives needed with new album.**

will accommodate from 150 to 250 prints of all sizes up to 8x10. It is covered in blue imitation leather, has a metal binder riveted to its covers for strength and durability, and the pages are cloth-edged to prevent buckling and fraying. An added feature is the provision of glassine envelopes for negative storage. The album is obtainable through dealers or direct from the manufacturer, Holsons Binders, 127 West 26th St., New York City.

HIGHLIGHTS of the recent banquet held by Agfa Ansco, commemorating a hundred years of continuous photographic activity since Edward Anthony laid the foundation in 1842, was the announcement of Ansco Color Film. This new type of direct color film can be developed under ordinary darkroom conditions and need not be returned to the manufacturer for processing. The film is now in continuous but limited production, and the total output is being used by the armed services. Civilian color enthusiasts will have to be patient and wait until war needs and priorities are a thing of the past.

Another new product announced at the banquet is Ozaphane, a sensitized cellophane for sound-track recording, produced as a continuous strip one-quarter inch wide. This new strip method of recording will permit uninterrupted playing of complete symphonies, and eliminate breakage and wear common to disk recordings.

TWO ITEMS for the darkroom are announced by the Friedell Laboratories. One is the Friedell Sensitometer and Actinometer, a calibrated transparent wedge through which contact and enlarging papers are exposed to determine their speed, tonal range, and contrast. A test strip measuring only 2x3¼ inches is required. The other is the Friedell Opacitometer and Actinometer, a calibrated gray scale for measuring the opacity and density, relative exposure factor, tonal range, and contrast of any negative. Priced at $2.50 and $1.50, respectively, these sensitometric aids are obtainabel direct from Friedell Laboratories, 1629 Telegraph Ave., Oakland, Calif.

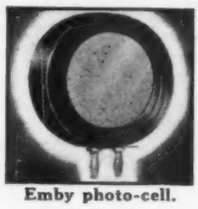
FACILITIES of the New York Institute of Photography, 10 West 33rd St., New York City, have been made available to The American Women's Voluntary Services for advanced photographic training. Special courses in Advanced Defense Photography have been instituted, and those members of the A. W. V. S. who qualify in preliminary tests are enrolled. The courses, prepared by Mr. Samuel Falk, president of the New York Institute, in cooperation with Mrs. Robert Frothingham and Miss Josephine Herrick of the A. W. V. S., specialize in flash photography and photo-journalism, and are especially designed to prepare the students in every phase of war-time and defense photography.

A NEW priority-free darkroom apron is now available for amateur and professional photographers. It is made of a transparent, flexible plastic material that is impervious to ordinary photographic chemicals. Priced at $1.50, the apron can be obtained from your dealer or direct from the manufacturer, Hydro-Tex, 564 W. Adams St., Chicago, Ill.

WORD HAS BEEN received that Howard L. Shonting, Editor of *Photographic Trade News*, recently enlisted in the U. S. Army as a candidate for officer's training school in the Photographic Section of the Air Forces. Shonting, who has edited this widely-read trade paper for the past two years, has an extensive background as a writer and photographer.

MADE OF FINEST quality material and designed by master craftsmen, the new line of precision-made camera cases announced by Frank A. Emmet Co., range in price from $1.50 to $19.95. The line includes pouch cases, slip-in cases, eveready cases, and gadget bags for camera and accessories. The latter are provided with compartments for various pieces of equipment, and larger sizes feature an outside pocket for flashbulbs and incidental equipment, as well as reinforced sides and covers for complete protection. Details and prices can be obtained from Frank A. Emmet Co., 1264 S. Fedora St., Los Angeles, Calif.

A NEW LINE of photoelectric cells for the photographer is announced by Emby Products Company, 1800 West Pico Blvd., Los Angeles, Calif. These cells generate enough current to operate meters and relays without the use of amplifiers, and are available in eight standard sizes to suit different needs. Used in conjunction with an inexpensive meter, similar to that used by radio servicemen, the cell performs all the functions of the exposure meter, enlarger meter, etc. It judges the necessary amount of light for exposure, and assures uniformity of prints and enlargements. A handy bulletin containing all technical data on the cells and their uses will be sent on request to Emby at the above address.



**Emby photo-cell.**

RECENTLY introduced on the market is the Ross Optical Lens Tissue, supplied in a waterproof pliofilm pouch to facilitate carrying and prevent soiling. The tissue is nonlinting, non-abrasive, and has great tensile strength. It is obtainable in the standard package, containing 100 3x5-inch sheets, for 35c. A larger "Economy" packet contains 300 4½x5-inch sheets and sells for $1.00. The tissue is available from dealers, or direct from the manufacturer, A. Rosmarin, 2117 83rd St., Brooklyn, N .Y.

A NEW instrument for measuring photographic density, the Ansco Sweet Densitometer, has been developed by Monroe H. Sweet of Agfa Ansco Research Laboratories. This densitometer presents many striking advantages over previous methods of density measurement. Readings can be made rapidly by even inexperienced operators, with a high degree of accuracy, and with a minimum of visual fatigue. The basis of the device is a photosensitive tube which, when placed in a beam of light, varies the flow of current which actuates a meter calibrated in terms of density. Complete technical specifications and price will be furnished on request to Agfa Ansco, Binghamton, N. Y.

AN ATTRACTIVE red-white-and-blue illustrated broadside entitled "Films That Fight for Freedom," recently issued by Bell & Howell, Filmosound Library, describes new 16 mm films of current interest in the defense effort. Among the headings are civilian defense, aviation, industrial training, morale-building recreation, emergency first aid, and victory gardening. A copy of the folder will be sent on request to Bell & Howell, 1801 Larchmont Ave., Chicago, Ill.

AN ENLARGED program in practical photography has been established at Ohio University, Athens, Ohio, in response to demands for photographic training coming

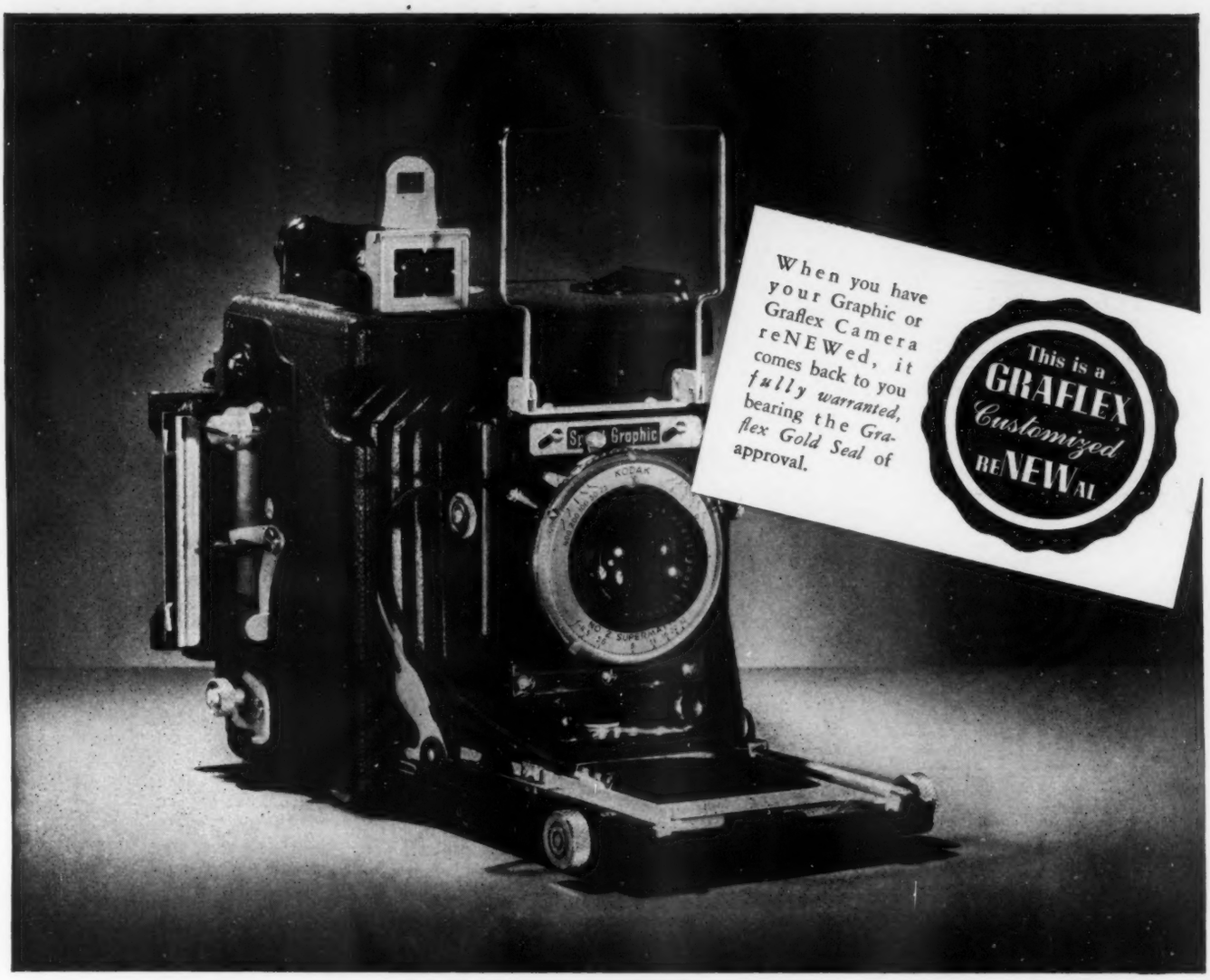
(*Continued on page 77*)

# CALENDAR OF PHOTOGRAPHIC EXHIBITIONS

| SALON | ADDRESS INQUIRIES TO | ENTRY FEE | ENTRIES ALLOWED | CLOSING DATE | DATES OPEN TO THE PUBLIC |
|---|---|---|---|---|---|
| 3rd North American Salon of Photography, Sierra Camera Club* | Edwin C. Rosenberg, Salon Chairman, 1001 E. Grove, North Sacramento, Calif. | $1.00 | 4 | Sept. 15 | Oct. 4—Oct. 31 |
| Atlanta Salon of Photography* | Mrs. George Bird, 685 E. Morningside Drive, Atlanta, Georgia | | | Sept. 19 | Oct. 15—Oct. 31 |
| 17th Annual Salon of Photography, Museum of Fine Arts of Houston | Salon Jury, Museum of Fine Arts of Houston, Main and Montrose Blvd., Houston, Texas | $1.00 | 4 | Sept. 19 | Oct. 4—Oct. 25 |
| 4th Annual National Salon, Lens Camera Club | R. W. Smith, South Side Community Art Center, 3831 S. Michigan Ave., Chicago, Ill. | $1.00 | 4 | Sept. 21 | Oct. 4—Oct. 30 |
| 2nd Annual International Salon of the Victoria Photographic Association | Al Woods, Rm. 4, 640 Fort St., Victoria, B. C., Canada | $1.00 | 4 | Sept. 26 | Oct. 23—Nov. 8 |
| 4th Annual Salon of the Fine Arts Camera Club | Thos. E. Douthitt, 213 S. Fairlawn Ave., Evansville, Ind. | $1.00 | 4 | Sept. 28 | Oct. 5—Oct. 18 |
| 1942 International Salon of The Photographic Society of America* | J. R. Gourley, Director, 5507 Ready Ave., Baltimore, M. D., or PSA, Franklin Institute, Philadelphia. Pa. | $1.00 | 4 | Oct. 6 | Oct. 23—Nov. 9 |
| 1942 New York Salon of Photography, The Camera Club* | John W. Doscher, Director, The Camera Club, 121 West 68th St., New York, N. Y. | $1.00 | 4 | Oct. 15 | Nov. 1—Nov. 30 |
| 3rd Annual Tri-State Salon of Photography, Amarillo Photographic Society* | D. W. Godsey, Secretary, Amarillo Photographic Society, 905-B Taylor St., Amarillo, Texas | $1.00 | 4 | Oct. 15 | Nov. 1—Nov. 14 |
| 6th Southern Salon (International) of Photography, Norfolk Photo Club* | H. F. Meath, Salon Chairman, 33 Government Ave., Norfolk, Va. | $1.00 | 4 | No. 14 | Dec. 6—Jan. 3 |
| 5th Annual Springfield International Salon of Photography, The George Walter Vincent Smith Art Gallery | Salon Secretary, Springfield Int'l Salon, The George Walter Vincent Smith Art Gallery, Springfield, Mass. | $1.00 | 4 | Dec. 5 | Jan. 2—Jan. 24 |
| 8th Annual Des Moines International Salon of Photography, Y.M.C.A. Movie and Camera Club | Walter Vittum, Salon Director, Y.M.C.A., Des Moines, Iowa | $1.00 | 4 | Dec. 15 | Jan. 1—Jan. 22 |

*Salon conducted according to the recommended practices of the Photographic Society of America.

See page 71 for schedule of POPULAR PHOTOGRAPHY'S Traveling Salons.


When you have your Graphic or Graflex Camera reNEWed, it comes back to you fully warranted, bearing the Graflex Gold Seal of approval.
This is a GRAFLEX Customized RENEWAL

# Treasure Your Present Graflex-made Camera ...Treat It To a *Customized* RENEWAL

When we've finished our job of helping to win the War, it will be easier to supply new Graflex and Graphic Cameras for civilian use. In the meantime, keep your present Graflex-made Camera in 100% operating condition.

To be sure you are enjoying *all* the precision performance built into your camera, take advantage of the Graflex Customized reNEWal Plan . . . a service where skilled craftsmen really reNEW your camera, at surprisingly moderate cost.

Simply bring your Graflex or Graphic to your Dealer who will ship it to the nearest factory reNEWal department. After careful inspection, our recommendations and a quotation of the cost will be forwarded to your Dealer. Upon your approval the work will be done promptly and your camera will be returned to you with the *Graflex Gold Seal* of approval. For literature on Graflex Customized reNEWal Plan, see your Dealer or write to The Folmer Graflex Corporation, Dept. PP1042, Rochester, N. Y., U. S. A.

And for facts that help you save time, trouble and materials in your photographic work, get *Graphic Graflex Photography* (**$4**) and *Photographic Enlarging* ($1.95) at your camera or book store. **Invest your savings in U. S. War Bonds and Stamps.**

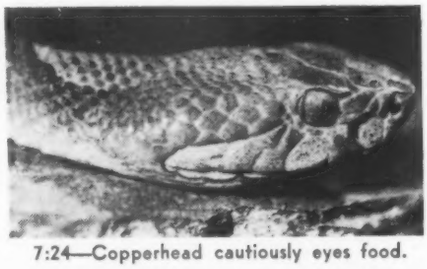
**FOLMER GRAFLEX CORPORATION, ROCHESTER, NEW YORK, U. S. A.**

GRAFLEX AMERICAN-MADE *War Prize-Winning* CAMERAS

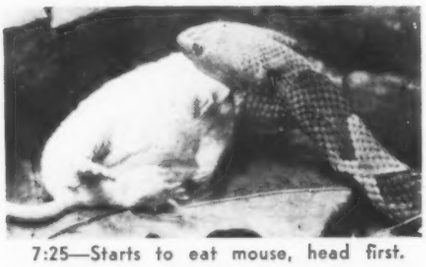
# *SEQUENCE* TELLS THE STORY

PICTURES arranged in proper sequence will tell a story far better than words. Richard Baldauf of Shillington, Pa., made this nature series to show the eating habits of a copperhead snake.

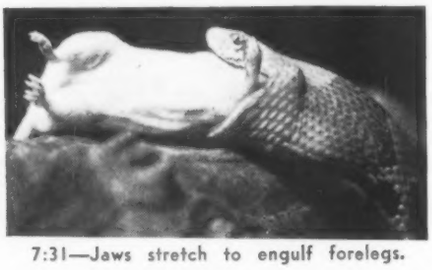
The exposures were made with a Leica camera, using a sliding focusing attachment to get extreme closeups. Two floodlamps provided illumination for exposures ranging from ½ second at *f* 12.5 to 1/20 second at *f* 4.5 on Du Pont No. 1 film. Approximately 18 minutes elapsed between the taking of the first and last pictures.



7:24—Copperhead cautiously eyes food.



7:25—Starts to eat mouse, head first.



7:31—Jaws stretch to engulf forelegs.

7:40—Hind legs still remain in sight.

7:43—Tip of tail is last to disappear.

# MONEY MAKING IDEAS

PLAYERS on high school football teams like to get pictures of themselves in uniform, in action poses. I take shots of this type, shooting from a low angle to get an effect that is very flattering. I make enlargements the size of a notebook cover and glue them to standard notebooks. Then a coat of transparent shellac is applied for protection. Since all high school students have homework, this gives them an opportunity to display the photographs as they carry their notebooks. They sell very well.—*Jimmie Lazaroff, 30 Crawford St., Pontiac, Mich.*

MANY people born before births were recorded now find it desirable to get birth certificates. This requires records from family Bibles, military records, church records, etc. The originals often cannot be sent in or the owner does not want to risk it. A photographic copy, on the other hand, can be made and sold at a profit for this purpose. By contacting notaries public, county offices, and other places where people apply for these records, you can find who is in need of this type of service and usually get the job. All it takes is the ability to make clear sharp copies.—*Rolland O. Coats, Hill City, S. D.*

PEOPLE like to have pictures of themselves at work. Recently I went to a lumber company's office to take some pictures in a model kitchen, and while I was there I made a shot of the owner at his desk. An enlargement of it sold at once, and without the slightest trouble. —*Paul M. Van Duesen, South Bend, Ind.*

NURSES in training are good picture prospects. By visiting a local hospital, you can usually interest one or two in having their photographs taken in uniform. When the others see the results of your work, you can count on a lot more orders. Sometimes they want group pictures, too.—*Ward Brumm, South Mountain, Pa.*

A MONEY making idea that is a "natural" is taking pictures of babies within a few days after birth. Arrangements should be made with the superintendent of the hospital, or you can photograph them through the window of the nursery where babies are shown through glass. I have found that small prints on doubleweight paper sell best.—*Frank G. Gardiner, Connersville, Ind.*

ARTISTS are quick to buy personal postcards which they can send out to their friends and to customers, telling them when and where their paintings are being exhibited. By keeping in touch with the shows, and through the newspaper review pages, I have been able to get commissions to make postcards of their current paintings for many of the artists who are exhibiting.—*Phillips St. Claire, New York, N. Y.*

EVERYBODY likes to see himself in movies, and you can make money by taking a reel of "candid" shots and projecting them under the auspices of a local service club, church group, or school class. Catch members at their favorite pastimes, in parades, at ball games, and wherever you happen to find them. The organization sells tickets at a small fee, and makes a profit after your expenses are covered.—*William P. Froom, Monmouth, Ill.*

THERE isn't a railroad engineer who isn't mighty proud of his job, and especially his pet engine. I go to the railroad yards, and get pictures of locomotives with their numbers showing and with the engineer's head visible at the window. These shots sell readily at a dollar apiece.—*F. M. Sterling, Knoxville, Tenn.*

IN almost every town there are places that sell used machinery. I went to one of these firms and took pictures of their stock, making 5x7 prints. I was paid well, and the pictures, sent in answer to inquiries, helped sell the machinery. Since then I have been called back to make pictures many times.—*Bernard J. Oram, Allentown, Pa.*

WHENEVER I wander out with my camera to a park or beach to take pictures, I slip a dozen or so penny postcards into my pocket, with my name and address stamped on them. I give cards to the people who appear in my pictures, and nine out of ten come back with inquiries through which I can sell enlargements.—*Fred Huddleston, Marion, Iowa.*

WHEN you are taking a trip, you can help pay expenses by photographing interesting subjects along the way. Collect information about them to write an article for a paper or magazine at the same time. On a recent trip I photographed a pet cemetery, and wrote an article about it. The sale of the article paid my expenses.—*Paris Miller Wolgemuth, Boston, Mass.*

**CASH IN ON YOUR IDEAS**

**Do you make money with your hobby? Write up your ideas briefly and send them in to Popular Photography. We are offering $3.00 for each new one accepted.**

# "Our Argoflex is Ideal for much of Our Studio Photography"

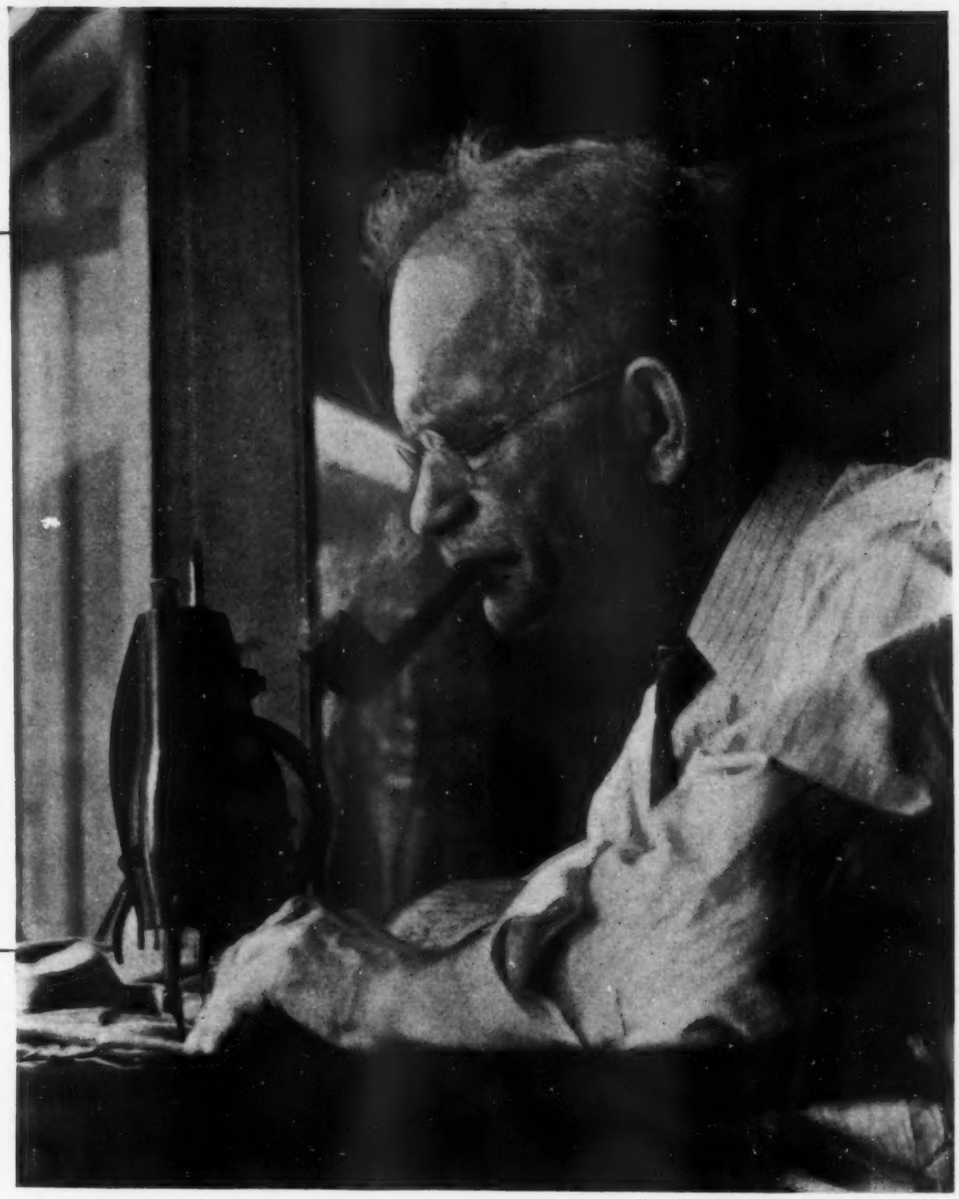
*says*

**SAM ELLISTON**

*of Bell Studio, Atchison, Kas.*

**TECHNICAL DATA**

*Film: Super xx*
*Exposure: 1/2 sec. f:18*
*Light: Soft Daylight*
*Film developer: D–76*
*Paper: Kodabromide G No. 2*
*Paper developer: D–72*



*The Old Tailor*

Professional quality in amateur snapshots is easy with the Argoflex. That's why many amateurs are using it professionally.

Argoflex has the right combination of features to make it an all-purpose camera. The full-size focusing ground glass helps in composing pictures . . . you get what you see. The color-corrected F:4.5 lens, precise split-second shutter, plus a high-powered focusing magnifier help in solving the three big problems of picture making: sharpness, exposure, speed.

Ask your Argus dealer to show you Argoflex.

**argus**

ann arbor michigan

*Fine American Made Cameras*

FREE! BIG 32 PAGE BOOKLET

"CHOOSING YOUR CAMERA"

Write Dept. 1007 today for your copy.

BETTER BUY
BOLEX
...at the lowest price in history!

Formerly $283.00
NOW $191.50 Including Excise Tax
(Without Lens)

STILL the same fine quality, precise BOLEX that has commanded the respect of discriminating amateurs throughout the world. At this price, you need no longer deny yourself of the masterful performance that BOLEX—and only BOLEX—can provide. Choose either the 8mm. or 16mm. and provide for yourself, your family and your friends a lifetime of "professional" movie-making entertainment. And now, just a word of caution: We advise immediate purchasing because we have no way of telling how long our present supply of these famous instruments will last.

Turn Your Equipment Into CASH! Fotoshop will pay TOP prices. The cash you can get for your present equipment today will more than pay for new equipment after the emergency. If you wish to trade, we will give you highest allowance. Whether you SELL or TRADE—CONSULT FOTOSHOP FIRST! Let us know what you have for approximate appraisal. Shipping carton sent free on request for accurate appraisal.

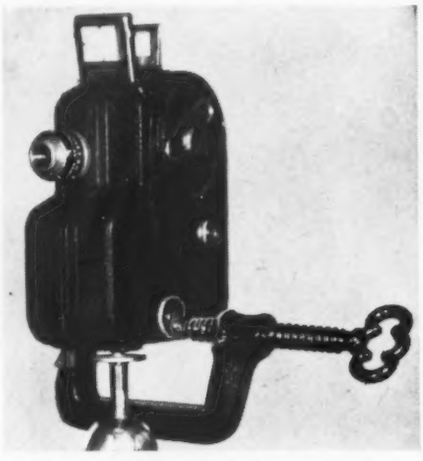
The new FOTOSHOP BULLETIN is yours for the asking. Write for it today.

42nd STREET
FOTOSHOP INC.
18-C East 42nd Street, New York City
Branch: 130-C West 32nd Street

# AMATEUR Movie Making

## Clamp Holds Release for Filming Yourself

HOW often have you had the desire to appear in some of the shots made by your camera? Unless it is equipped with a motor lock, which permits unattended operation, you will probably remain the unsung hero of many of your home movies. At times, of course, someone can be asked to press the button while you take a turn before the lens, but this is not always possible.



With a C-clamp tightened over the release button, you can get into your own movies.

If your camera has the type of release button that is mounted in a recess, a reliable and easily operated motor lock can be devised by making a simple change on a small C-clamp. One can be purchased at a hardware store for about ten cents.

The change necessary is to remove the swivel foot that is mounted on the inner end of the clamp screw. You will note that the foot is connected by small prongs encompassing a ball formed on the screw. This screw is turned out all of the way until the prongs, being forced by the clamp body, are pushed off of the ball. This can be done by hand, as the force required is small. The swivel foot is discarded.

Set the camera up on its tripod, place the clamp over the camera body and turn the screw in until the ball rests in the release button recess, but does not depress the button. In this position, the clamp will remain on the camera until everything is ready for shooting.

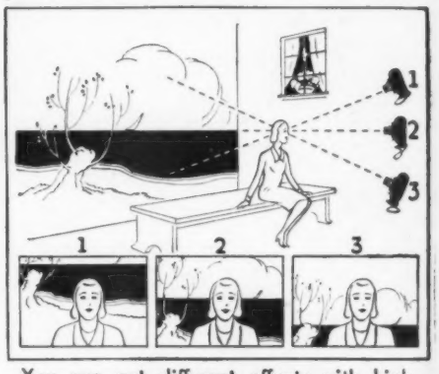
To start the camera, it is only necessary to give the clamp screw about a quarter turn to depress the release button. You then can leave the camera unattended and take part in the action before the lens, hurrying back to stop the camera when you are through.

It may be necessary to edit out the frames at each end of the scene, in which you are entering and leaving it, or you can make your entrance and exit a part of the action. You can avoid having to loosen the clamp to stop the camera by winding it up only far enough to expose the footage you want to take. In this way, the camera will stop by itself at the right time.—*Kingston Kirkpatrick, Detroit, Mich.*

## Watch Your Camera Angle

THERE is no one camera position from which every movie scene should be filmed. Shots can be taken from eye level, or from high or low angles. The photographer's choice sometimes determines the success of the whole scene.

In selecting the camera angle for a movie shot, watch to see how the subject will look from that angle, and also what background it will place the subject against. Both these things are important.




You can get different effects with high (1), medium (2), and low (3) angle shots.

The effect of each viewpoint is shown in the accompanying illustration. A high camera angle (1) places the subject's head against the background of the earth. At eye level (2) the head is likely to be on the horizon. With the camera low (3) the subject is shown against the simple background of the sky.

Each of these camera angles has its use, and the trick is to select the one that will tell the story best in the particular scene you are shooting.

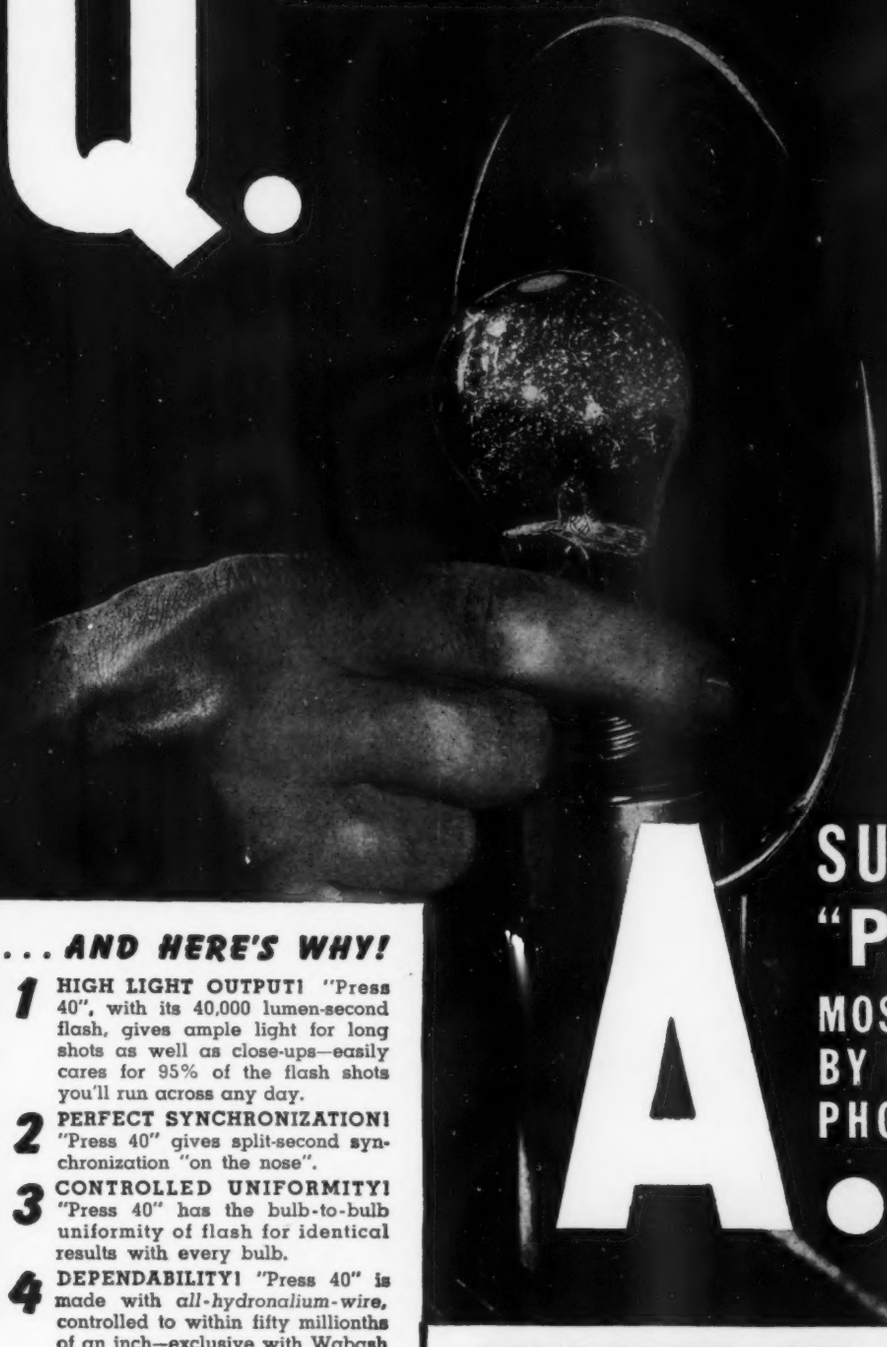
## Frame Aids Composition

A HANDY device to help get good composition in your movies is a small frame, cut to the same proportions as a single movie frame. You can make one by cutting a hole of the proper dimensions in a sheet of metal or fiber.

When held at the proper distance in front of the eye, this gadget reveals about the same field of view that will be covered by the camera lens. Check it with your viewfinder to find the right distance at which to use it.

Carry this frame with you when you are filming, and use it to help improve composition. It is more handy to use than the regular finder for preliminary viewing, as it is lighter and easier to see through.—*Louis Ell, Madrid, Nebr.*

# Q. WHAT FLASH BULB IS BEST FOR ALL 'ROUND PHOTOGRAPHY?



# A. SUPERFLASH "PRESS 40"

MOST WIDELY-USED BY PROFESSIONAL PHOTOGRAPHERS!

**. . . AND HERE'S WHY!**

1. **HIGH LIGHT OUTPUT!** "Press 40", with its 40,000 lumen-second flash, gives ample light for long shots as well as close-ups—easily cares for 95% of the flash shots you'll run across any day.
2. **PERFECT SYNCHRONIZATION!** "Press 40" gives split-second synchronization "on the nose".
3. **CONTROLLED UNIFORMITY!** "Press 40" has the bulb-to-bulb uniformity of flash for identical results with every bulb.
4. **DEPENDABILITY!** "Press 40" is made with *all-hydronalium-wire*, controlled to within fifty millionths of an inch—exclusive with Wabash Superflash.
5. **COLOR!** "Press 40" has the highest color temperature of standard flash bulbs — 6,000° Kelvin — for more faithful rendition in color or black and white.
6. **STANDARD!** "Press 40" fits all standard synchronizers and built-in flash cameras. No "gadgets" needed.

# WABASH

**SUPERFLASH & SUPERFLOOD**

WABASH PHOTOLAMP CORP., BROOKLYN, N. Y.

*FIGHT THRILLS REVIVED!*

**HOME MOVIES**

**of Famous Championship**

**RING BATTLES**

***at Sensationally***

***LOW PRICES!***

Fight fans! Fotoshop makes it possible for you, once again, to enjoy the great fights of the past. At these greatly reduced prices, you can complete your fight film library at little cost. Order today!

**FULL LENGTH FEATURES—**

| Leonard-Tendler<br>Sharkey-Maloney<br>Carnera-Schaaf<br>Firpo-Brennan | Dempsey-Tunney (1st)<br>Baer-Doyle<br>Ross-Petrolle<br>*and others* |
|---|---|
| **8mm.—180'** | **16mm.—360'** |
| *Reg. $5.50* | *Reg. $8.75* |
| NOW **$3.69** | NOW **$6.49** |

**SOUND-ON FILM, 360'**

*Reg. $17.00* NOW **$12.50**

**SHORTS—**

Louis - Schmeling, Dempsey - Tunney, Leonard - Tendler, Dempsey - Firpo, Chocolate - Battalino, Tunney-Carpentier, Schmeling-Walker, Louis-Galiento . . . *and many others.*

| **8mm.—50'** | **16mm.—100'** |
|---|---|
| *Reg. $1.75* | *Reg. $2.75* |
| NOW **$1.29** | NOW **$1.89** |

**Write for List, C-1**

**PROJECTORS**, 8 and 16mm, available, $7.50 and up.

**Write for List, C-2**

**FOTOSHOP, Inc.**

**18-C East 42nd St., New York, N. Y.**

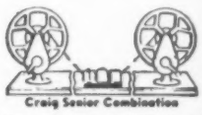
**Branch: 130-C West 32nd Street**



**CRAIG** *Makes Editing a Pleasure!*

**Craig Senior Splicer**

Makes permanent splices easily—in only four operations and without wetting film. Has built-in cutter and dry scraper. $10.95 (Jr. Splicers, $3.95).



**Craig Senior Combination**

CRAIG SENIOR REWINDS and Combinations afford highest efficiency in Rewinding, Editing and Repairing. Adapt all S & 16 mm. reels. Rewinds, $5.00 ea. Combinations (with Sr. Splicer), $21.50.

OTHER CRAIG PRODUCTS INCLUDE

PROJECTO-EDITORS for editing the Hollywood Studio Way

CRAIG FILM CEMENT for splices that stick!

CRAIG FOTOFADE and FOTOFADE KIT for making smooth "Fades" and "Wipes"

CRAIG CINETINT KIT 6 Crystal-clear Dyes for tinting movie film

AT ALL DEALERS!

"CRAIG PRODUCTS ARE NOW IN USE BY MANY BRANCHES OF THE U.S. ARMED FORCES"

**CRAIG MOVIE SUPPLY CO.**

*Los Angeles—Seattle—San Francisco*



**DEVELOP YOUR OWN MOVIES**

**IT'S EASY AND THRILLING**

Send for one of these low cost sets and develop your own movies! Consists of developing rack, tray, safelite, and set of prepared developing powders. Simple step-by-step instructions insure good results. Order today.

SIMPLIFIED DEVELOPING OUTFITS including our Prepared Chemicals. For 30 ft. Single 8, $4.20; 33 ft. Dbl. 8 & 16, $5.95. Instructions furnished Free. Powders only: ½ Gal. Set, $1.30; One Gal. Set, $1.95. Write for Big Bargain Circulars, our bulk film prices.

**FROMADER GENERA COMPANY, Davenport, Ia.**


# NEW *Home* MOVIES

**THE SCREEN TEST, with Buster West and Tom Patricola. 16 mm sound. Price on request. Astor Pictures Corp., 130 W. 46th St., New York City.**

Two of the best American comedians combine their talents in a 20-minute feature. The trouble this duet has in breaking into the movies will provide many a laugh for youngsters and adults.

• • •

**THIS WAS MODERN POLAND. 16 mm sound. 1 reel. Rental and Sale prices on request. Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill.**

Made shortly before the Nazi invasion, this film shows Polish life as it was. There are scenes showing the steel mills, coal mines, Gdynia harbor installations, and towns, farms, factories, and the cultural and religious life in the Polish republic. It was produced by Russell Wright.

• • •

**CIVILIAN FIRE FIGHTERS. 16 mm: 360-ft. $8.75; 350-ft. sound $17.50. 8 mm: 150 ft. $5.50. Castle Films, Inc., 30 Rockefeller Plaza, New York City.**

The organization of auxiliary fire-fighting units is covered thoroughly in this picture. Bombing possibilities are outlined, as well as specific methods by which the non-professional can cope with such menaces as the thermite incendiary bomb, which burns at a temperature of 4,300 degrees F.

• • •

**FIGHT FOR EGYPT. 16 mm: 100-ft. condensed $2.75; 360-ft. complete $8.75; 350-ft. sound $17.50. 8 mm: 50-ft. condensed $1.75; 180-ft. complete $5.50. Castle Films, Inc., 30 Rockefeller Plaza, New York City.**

Filmed under fire, this picture contains amazing fighting scenes from desert battles. Savage tank attacks send up clouds of dust. Damaged tanks are picked up by huge trailer trucks in the thick of the fire. The spectator rides with bombers as they dive into the thick of the fray, dropping their deadly loads on enemy mechanized equipment.

• • •

**SPORTS SPELLBINDERS. (Lengths and prices as above.) Castle Films, Inc., 30 Rockefeller Plaza, New York City.**

Thrills and spills in a dozen sports are shown in this action film. The masters of high hurdling, broad jumping, pole-vaulting, and high jumping, appear as well as experts in more unusual sports. There is tuna fishing, water skiing and ski sledding, and outboard motorboat racing with a skittering boat that runs wild on the shore, crashing over a parked automobile. A great jallopy race, with cars of ancient vintage on a track full of bumps and holes, brings a mirth-provoking climax.

• • •

**AFRICAN PIGMY THRILLS. (Lengths and prices as above.) Castle Films, Inc., 30 Rockefeller Plaza, New York City.**

Africa's diminutive tribesmen, reputed to be the most difficult and elusive human beings to photograph, are shown building a bridge across a mighty river to escape man-eating crocodiles below.

• • •

**LITTLE BLACK SAMBO. (Lengths and prices for black-and-white as above; color prices on request.) Castle Films, Inc., 30 Rockefeller Plaza, New York City.**

Based on a favorite childhood tale, this story is enacted with a new twist. Sambo has a hectic adventure with two tigers, one fake and one real.

• • •

**THE HEADLESS HORSEMAN. (Lengths and prices for black-and-white as above; color prices on request.) Castle Films, Inc., 30 Rockefeller Plaza, New York City.**

The fun is provided by Ichabod Crane and Brom Bones in their rivalry for the hand of the fair Katrina. Ichabod is routed by Brom, dressed as the Headless Horseman, but there is a surprise when Brom leads Katrina to the altar.

• • •

**DREAMING LIPS. 16 mm sound. 71 minutes. 1 short subject included in rental. Prices on request. Commonwealth Pictures, 729 Seventh Ave., New York City.**

A drama of a woman torn between her love for her young composer husband and a man-of-the-world violinist, starring Elizabeth Bergner and Raymond Massey.

• • •

**EDGE OF THE WORLD. 16 mm sound. 72 minutes. 2 short subjects included in rental. Prices on request. Commonwealth Pictures, 729 Seventh Ave., New York City.**

The story of a strong, hardy people faced by insurmountable natural odds on a lonely island. Recommended by Dept. of Secondary Education, N.E.A. Starring John Laurie, Bell Chrystall, and Eric Berry.

• • •

**OUR DAILY BREAD. 16 mm sound. 74 minutes. 2 short subjects included in rental. Prices on request. Commonwealth Pictures, 729 Seventh Ave., New York City.**

A human interest story on social and economic problems, comparable to "Grapes of Wrath" in its power. Produced by King Vidor, and starring Karen Morley, Tom Keene, and John T. Qualen.

• • •

**ONE RAINY AFTERNOON, starring Francis Lederer and Ida Lupino. 16 mm sound. Commonwealth Lending Library; 729 Seventh Ave., New York City.**

A comedy involving a struggling young actor with ambitions to become a star. Additional interest is provided by some amusing lady reformers, and a court trial which turns out to be a love scene.

• • •

**LOVE FROM A STRANGER, starring Basil Rathbone and Ann Harding. 16 mm sound. Commonwealth Lending Library, 729 Seventh Ave., New York City.**

A pretty stenographer wins a sweepstakes fortune, goes to Paris, and marries a handsome stranger after a whirlwind romance. Top-notch acting and plenty of dramatic punch give this picture a genuine appeal.

• • •

**THE CANDY KID. 8 mm silent. 2 reels. Sale price $9.90, rental $1 per day. Fotoshop, Inc., 18 E. 42nd St., New York City.**

A Billy West comedy, with all the ludicrous situations you'd expect. As usual, the star gets into one difficulty after another, emerging victorious in the end. Suitable for the entire family.

• • •

**MIDDLE EAST. 16 mm sound. 1 reel. Price on request. Walter O. Gutlohn, Inc., 25 W. 45th St., New York City.**

A sound short of unusual significance, depicting the strategic importance of the Middle East in the present war. Includes maps and animation.

• • •

**MASK MAKING. 16 mm silent. 1 reel. Price on request. Walter O. Gutlohn, Inc., 25 W. 45th St., New York City.**

Produced by Remo Bufano, famous maker of masks, who has created over 3,000 of them in papier-mache for such clients as circuses, the Metropolitan Opera, and others. Traces the entire process in an interesting and understandable way.

• • •

**HOW TO READ A MAP. 16 mm silent. 1 reel. Price on request. Walter O. Gutlohn, Inc., 25 W. 45th St., New York City.**

Suitable for schools and for the general public, this unique short shows how to interpret geographical and military maps. Many drawings are included.

• • •

**WINGS FOR VICTORY. 16 mm: 360-ft. $8.75; sound, $17.50. 8 mm: 180-ft. $5.50. Official Films, Inc., 425 Fourth Ave., New York City.**

A drama of the Arctic air lanes, showing Canada's conquest of the frozen North through air power. Tells of the northern route to Europe and Asia, isolated weather stations, lonely outposts, and bombers being ferried to Britain.

• • •

**FLIP THE FROG. Six separate animated cartoons. 8 mm: 50-ft. short $1.75; 180-ft. feature $5.50. 16 mm: 100-ft. short $2.75; 360-ft. feature $8.75; 350-ft. sound $17.50. Official Films, Inc., 425 Fourth Ave., New York City.**

Flip's humorous adventures, a real comedy treat, are shown in these cartoons. Each one is available in both short and feature lengths. The titles are *Jail Birds, Movie Mad, The Village Barber, Stormy Seas, The Cuckoo Murder Case,* and *The Village Smitty.*

## Bas-Relief Titles

AMATEURS who make still pictures as well as movies can produce interesting titles by making up bas-relief prints of the lettering before it is filmed. The bas-relief effect makes the title stand out as though it were chiseled in stone, giving it a third dimension.

To produce this effect, letter your titles in black ink, using a wide, flat lettering

brush. Put them on white bond paper, preferably with a rough texture, and don't be too careful to get the edges even or the tone smooth.

When the title is finished, set it up before your still camera and make a copy negative of it. When this negative is dry, make a film positive from it by contact. Then dry the positive, and you are ready to make the bas-relief print.

Place the negative and positive together, slightly off register, and tape them tightly. Then make a print through the combined pair—by contact or enlargement. The result will be a fine bas-relief print which then can be filmed in the normal way with your movie camera. —*Louis Hochman, Brooklyn, N. Y.*

## Old Shutter Provides Smooth Transitions

WITH the aid of an easily made accessory, you can provide very satisfactory fadeouts and increase the interest in your movies. The accessory is nothing more than a still camera shutter housing, from which the lens elements have been removed. This is mounted on the movie camera by a cardboard tube. One end of the tube is fitted into the opening in the rear of the housing, while

Mounted in front of the lens, shutter cuts off view as diaphragm is closed.

the other end is slipped over the camera lens barrel.

With the camera thus set up, smooth changes from one scene to another are made as follows:

Open the attached shutter on "time," and open the iris diaphragm wide. Then start the camera, and after the desired footage is run off, slowly close the shutter diaphragm to its smallest opening. The camera is then stopped and set up for the next scene. During the start of this one, the diaphragm is slowly opened from its smallest to largest stop.

It will be seen that this operation gradually decreases the field of view of the camera lens at the close of the first scene and widens it at the start of the second.

Mount the shutter housing as far in front of the camera's lens as possible without interfering with the normal field when the diaphragm is wide.—*Kingston Kirkpatrick, Detroit, Mich.*


Bring HUMOR to your Home Movie Screen with "FLIP THE FROG"

Animated Cartoons . . . Presented by OFFICIAL FILMS, INC.

8 & 16 mm. Silent or Sound

Here's a lovable little cartoon character whose amusing antics will bring gales of laughter to your home movie audience. See him as a detective, as a prison guard, as the village barber, in these newly released sound films. Your local dealer has these six cleverly animated cartoons . . . for sale or rent.

Order From Your Dealer Today!

| | |
|---|---|
| 8mm. SHORT | $1.75 |
| 8mm. FEATURE | 5.50 |
| 16mm. SHORT | 2.75 |
| 16mm. FEATURE | 8.75 |
| 16mm. SOUND | 17.50 |

write for literature describing the complete line of Official Films.

"JAIL BIRDS" "MOVIE MAD" "STORMY SEAS"

"THE VILLAGE BARBER" "CUCKOO MURDER CASE" "THE VILLAGE SMITHY"

OFFICIAL FILMS INC.

425 Fourth Ave., New York City

I Pay HARD CASH

BASS

See me for HARD to Beat values in New and USED Cameras

- Argus Home Viewer and 2x2 Projector..$ 44.00
- Argus Projector, $22.75. Carrying case. 3.50
- Cine Kodak Specials . . . Sound Projectors .....
- Leica and Contax . . . new, used . . . and accessories .....
- Filmo 70DA with 1" F:1.5—2" F:3.5 and 4" F:4.5 lens..... 227.50
- Revere 88 with F:3.5 lens..... 38.50
- Revere 99 turret camera with ½" F:2.5 lens ..... ..... 77.50

Write Dept. P.P.

*Who Said I've Got A Heart of Stone?*

Nothing flinty about me . . . except the hard cash I lay on the line for your cameras and equipment. I'm really a "soft touch" when it comes to making a deal or a trade. So mail in your camera treasures . . . better still, make a personal appearance. Something about the sight of a camera makes me speechless—but you'll hear my money talk!

*Charles Bass* President

Bass Camera Co.

179 W. MADISON ST., CHICAGO, ILL.

..."FOR THE LOVE OF MIKE, I WISH YOU'D STOP THE EFFECTS OF THAT LITTLE ADVERTISEMENT"..

"I sold and shipped the outfit within five days after POPULAR PHOTOGRAPHY appeared on the newsstands. But *still they come* with checks and money orders. I could have sold fifty—

Mr. Editor—can't you do something to stop the flow of inquiries, checks, etc.?"

DR. J. K.,
West Virginia.

POPULAR PHOTOGRAPHY Classified ads pay dividends. Buy—Sell—or Swap your cameras or Equipment. See page 100.

BARGAINS on RELOADS!

Be sure of getting new film but don't pay high prices! We sell guaranteed fresh Eastman, or Agfa Film (your choice) for your Camera—at these low prices!

36 exp. roll, 35MM, 40c; 3 for $1.00
18 exp. roll, 35MM, 30c; 4 for $1.00

Guaranteed fresh, clean stock. Perfect. No scratches or short ends. Cartridges FREE! Supply limited. Order TODAY. Be sure to state size of film required.

35 MM FILM DEVELOPED Magic Eye Timed VAPORATED ENLARGED 60¢

We give you brilliant 3x4 enlargement on Deckled-Edge Velox paper at these low prices: 35mm, 36 exp. $1.00; 18 exp. 60c; 16 exp. No. 127 roll, 50c; 8 exp. No. 828 Bantam, etc., 25c; reprints, 3x4, each 3c. 24-hour service. No delay. Not too fast. Not too slow. But just right for superb quality! FREE Mailers.

AMERICAN STUDIOS, Dept. 420, LA CROSSE, WIS.

FOR FINE "Blow Ups"

Halobrome

HALOID

THE HALOID COMPANY

MAIN PLANTS AND OFFICES • ROCHESTER, N. Y.

Boston Office ..... 141 Milk St.
Chicago Office ..... 608 So. Dearborn St.
Detroit Office ..... 144 Lafayette Blvd.
Los Angeles Office ..... 1206 Maple St.
New York Office ..... 330 West 42nd St.
Philadelphia Office ..... 1015 Chestnut St.
San Francisco Office ..... 450 Mission St.
Washington Office ..... 15th and K Sts. N. W.
Canadian Distributors: Rectigraph Co. of Canada, Ltd., Toronto

PROJECTION PAPER

Successfully combining photographic excellence with cost-cutting processing advantages... Halobrome is popular favorite of thousands of practical photographers who demand fine prints at less cost with minimum waste.

Designed to meet these high specifications — Halobrome's beautifully-balanced, extra rich emulsion captures minute detail with unusual brilliance and depth. From snapshot to salon print, Halobrome offers realistic "contact" beauty. In processing, too, Halobrome is noted for exceptional latitude, development tolerance, print control and other cost-cutting factors Reason enough for the popularity of this ideal projection paper.

Other favorite Haloid photographic papers include :

HALO—Contact finishing paper INDUSTRO—Commercial Contact Paper
OUTLINE SPECIAL—The paper that folds and mails without cracking.

# Print Criticisms

*M. T., Boulder, Colo.*—Too much detail is the main fault of this picture. The blossoms merge with the splotchy background, and are not arranged to form a pattern which might serve to unite them. We suspect you were influenced by the bee on the blossom at bottom center of the picture, and wanted to show him at work. The most obvious way of doing this would have been to make an extreme closeup, or to enlarge the small portion of the negative on which the bee appears. It is only after considerable examination that the bee is finally seen. Forgetting the bee, you could have made an attractive arrangement of the blossoms. Using a plain background—perhaps a dark gray card held behind them—would have made them stand out better. By using a well-defined spray or two, you could have obtained a picture with pleasing composition. Beware of small details which tempt you to snap pictures of them, unless they can be shown large enough to serve as the subject matter of your photograph.

*Photo by M. T.*

Left: Closeups bring out small objects that would be lost in pictures taken from ordinary distances.

* * *

*E. A. G., Parry Sound, Ont., Canada.*—A double portrait is a difficult assignment, and the one you have here shows good handling for an informal, outdoor shot of this type. However, we would suggest cropping as indicated by the black lines to make a more pleasing composition. It is better to plan pictures of this sort with such a format in mind—sometimes it is hard to get just what you want by cropping the print. You did well to keep unity in the picture by having both subjects look in the same place. However, it might have been a bit better to have them looking more toward the camera. It is not necessary to have portrait subjects looking at the camera, by any means, but it is a good idea to avoid part profiles when you can. An easy way to do this, unless you want a real profile shot, is to watch the tip of the nose and keep the subject faced enough towards the camera so it does not project beyond the background of the cheek.

*Photo by E. A. G.*

* * *

*W. R. J., Blacksburg, Va.*—You ask the cause of the dark "haze" around the shadow portions of this picture, and of the lack of sharp contrast in the subject.

*Photo by W. R. J.*

These things are easily seen in your print, but are not quite as obvious in this reproduction. The dark "haze" around shadow areas can be caused easily by enlarger vibration during the exposure. This particular type of print, lacking contrast in spite of good blacks and whites at the extremes of the scale, often is the result of enlarging without masking down the negative carrier to the size of the film. White light is permitted to shine directly through the lens, where it is reflected by the different elements, and onto the easel. This light is much stronger than that passing through the film, and is reflected onto the paper by the lens elements and by anything light in color that happens to be near the enlarger. This light strikes the whole surface of the paper, exposing highlights and shadow areas alike. All parts of the picture are degraded by it.

* * *

*Sgt. E. S., Manchester, Tenn.*—There seems to be a bit too much in your silhouette. The main subject is well chosen for this type of picture, as it is easy to recognize a man with field glasses even in a picture with no shadow detail. However, in this case the subject is so small in relation to the rest of the picture that he is overshadowed by the tree trunks and branches. It would have been better to move in closer, including only enough of the other detail to frame the subject and suggest the locale of the picture. This would have made the subject stand out more clearly, so he would be seen at once. In silhouettes, where things often are more difficult to recognize than in full-scale pictures, it pays to use extra care in planning your shots to make certain that no important parts will be overlooked.

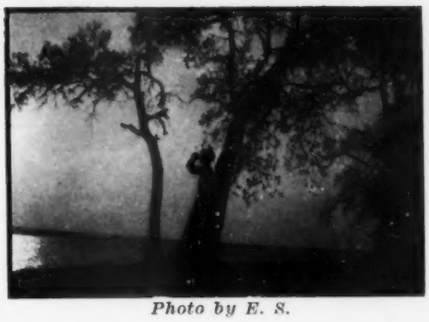


*Photo by E. S.*

* * *

*J. A. R., Chicago, Ill.*—Taking pictures of this sort is an absorbing photographic pastime, and one that occasionally produces a prize-winning shot as well as providing excellent practice. The low main light produces the dramatic effect you were seeking, but it would have been better to add a fill-in to it or an additional light to illuminate the background slightly. The fill-in light would have given a little detail in the shadows, and by proper placement could have been made to bring out the revolver more sharply. A weak light on the background would have outlined the subject's shoulders, giving an opportunity to use them as a part of the story-telling picture. The head and hand now are disconnected, with a sea of shadow in between, and additional lights — comparatively weak ones—would have overcome this. Keep on working with picture setups of this sort. It is fun to plan them out and take the pictures, and you can learn a lot about posing and lighting by taking pictures like this and then analyzing them to see where they can be improved.

*Photo by J. A. R.*

# Medals with a certain gift of prophecy

THESE are a few of the medals for original research and accomplishment that have been awarded, from time to time, to scientists in the Kodak Research Laboratories. They are shown here not to emphasize a glorious past, but because they have a certain gift of prophecy . . .

> The Kodak Laboratories have some of the qualities of great universities and the philanthropic research foundations . . . Scientists and young men with an idea often come here to Rochester. They get a hearing. If the idea is reasonable, and original, they get encouragement. If needed, they get the help of men of vast experience, and the best facilities the world affords.

Some of the greatest of recent developments in photography have come from such collaboration. The Kodachrome process—movies and snapshots in full color . . . "ultra-speed photographs"—exposures of as little as 1/1,000,000 of a second—which show what the eye alone can never see...the aerial films which are now enabling our country's flyers to cut through camouflage with their cameras or observe the success of their bombs from beyond the reach of anti-aircraft.

*Pure research is not self-seeking.*

For example, it doesn't "pay" Kodak to make 125 different types of plates for astronomical photography—but without them, the observatories of the world would be half-blinded. Such work may never pay in dollars, but our growing knowledge of the Universe depends on it. And who knows what day—or night—may bring a discovery that will change the entire pattern of our thinking and lead us to another world?

> These medals are important—as symbols of a search that never ceases. They stand for the enrichment of our lives in many ways thus far . . . from the simple snapshot of a loved one, to the last great movie you saw, faultless in its recording of scenes and sound.

And the work of the vast laboratory at Kodak Park was never so significant as at the present time . . . Eastman Kodak Company, Rochester, N. Y.

**Kodak...serving human progress through photography**

Progress Medal,
Society of Motion
Picture Engineers
(1936)

Adolph Lomb Medal,
Optical Society of America

Progress Medal,
Royal Photographic Society
(1913)

Henry Draper Medal,
National Academy of Sciences

Progress Medal,
Society of Motion
Picture Engineers
(1939)

Trueman Wood Medal,
Royal Society of Arts

Gold Medal,
American Institute of Chemists

Nichols Medal,
New York Section,
American Chemical Society

Janssen Medal,
Société Française de Photographie

Edward Longstreth Medal,
Franklin Institute

Progress Medal,
Royal Photographic Society
(1928)

Adelskold Medal,
Photographic Society of Stockholm

Niépce Daguerre Medal,
Société Française
de Photographie

Henderson Award,
London and Provincial
Photographic Association

Gold Medal,
Photographic Society
of Vienna

Hurter and Driffield Medal,
Royal Photographic Society

John Scott Medal,
City of Philadelphia

## A few KODAK MILESTONES of direct interest to the public

**1884** Eastman invents paper "stripping" film—the beginning of photographic film.

**1888** The No. 1 Kodak and birth of the photofinishing system ("You press the button—we do the rest") popularize amateur photography.

**1889** First commercial production of transparent roll film, including the film that first made motion pictures practical.

**1891** Daylight loading of their cameras enables amateurs to buy and use film anywhere.

**1898** The Folding Pocket Kodak—ancestor of all modern folding roll-film cameras—is perfected and placed on the market.

**1900** The dollar Brownie makes photography the sport of millions.

**1903** Kodak's new easy-to-handle "non-curling" film greatly simplifies the processing of still pictures.

**1913** Eastman brings out special sheet films to replace cumbersome glass plates in portraiture and X-ray work; also the first panchromatic film for motion pictures.

**1918** Fast double-coated X-ray film stimulates the growth of radiology.

**1923** Eastman system of amateur cinematography, with 16-mm. cameras, projectors, films, and reversal processing, makes home movies practicable.

**1928** Kodak introduces first amateur motion pictures in full color.

**1931** New films inaugurate use of high-speed panchromatic materials throughout black-and-white photography—snapshots at night, for example.

**1932** Ciné-Kodak Eight, plus 8-mm. projectors and films, places home movies within the reach of almost everyone.

**1935** Full-color Kodachrome Film becomes the gateway to the new era of color photography.

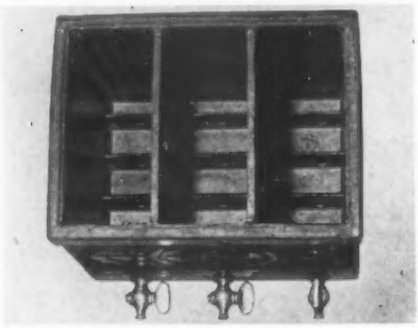
**1941** Kodak introduces the first direct full-color photographic prints (Minicolor, Kotavachrome).

**1942** Kodacolor Roll Film completes the photographic cycle, making it possible to get full-color snapshots with any ordinary camera—even a Brownie.

## Tank from Battery Case

WHILE the idea of converting a discarded storage battery case into a developing tank for pack and sheet film is not new, the model illustrated here is somewhat more complete than most.

It's usually possible to find a battery case at a service station or battery shop, or in a junk yard. You'll also need 3 pet-

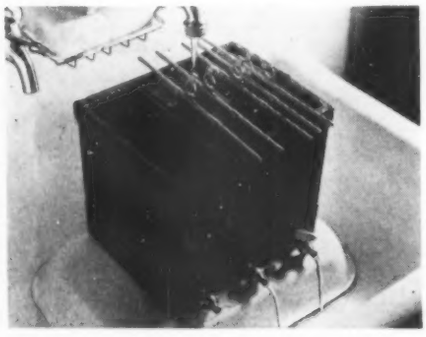


Tank has sections for developer, rinse, and hypo. Petcocks give quick drainage.

cocks, which should be of brass if possible. These can be obtained from a marine supply shop, hardware dealer, garage, or second-hand store, and should be equipped with threaded pipes about ¼" long.

First, clean the battery case thoroughly. In order to be sure that no traces of strong acid remain, rinse out the compartments with an alkali bath, such as a weak solution of lye, followed by warm water. Take a hot knife or screw driver and gouge out the tar from each cell, taking care not to damage the hard-rubber dividers between the cells. Then pull out the plates, after which you can scrape off most of the remaining tar with the hot knife. Warm water and a stiff scrubbing brush will complete the cleaning job.

Now bore a hole through the front side of each compartment, just above the level of the bottom. (You can generally figure the bottom of the case to be about ⅜" thick.) Continue the holes right through all the fins which stick up from the bottom of the case. You can thread the pet-



After processing, films can be washed in tank. Petcocks regulate flow of water.

cocks directly into the holes to secure a tight, permanent fit.

Use a compartment for the same solution each time. The films are suspended in the solutions by ordinary film hangers, as shown. The rinse compartment can be used for washing film, with the flow of water being controlled by the petcock.—*Donald F. McKenzie, Scotia, N. Y.*

# What the Camera Clubs Are Doing

### Toledo Club Avoids Trouble on Waterfront Picture Hike

An opportunity to take waterfront pictures without danger of landing behind the bars was provided members of the Toledo Camera Club recently through the foresight of its officers. Before the outing was announced, arrangements were made with the U. S. Coast Guard. Attendance was limited to members and their guests, and all participants wore identifying badges.

Any pictures were permitted, as long as they did not show bridges, channel markers, or other details that might interest our enemies. The arrangement required home processing of all pictures taken on the outing. Before planning field trips in waterfront areas or similar places where picture taking may be restricted or prohibited, it is a wise precaution to check with the proper authorities.

### Merchandising Plan Creates Interest for St. Cloud Club

Members of the St. Cloud, Minn., Camera Club recently hit upon the idea of planning monthly picture assignments in keeping with the needs of local merchants, gaining publicity and prizes in return for the use of

This is the window display which provided prizes and publicity for St. Cloud club.

photographs in window displays. For June the club assignment was to obtain pictures of men suitable for use in an exhibit for Father's Day. The eight best pictures were selected, mounted on 16 x 20 mounts, and offered to a local department store for display according to the club's plan.

The store provided $10.00 in prizes, with the winners to be selected by window shoppers. The display was set up, and passers-by were invited to select the three pictures they liked best. In this first attempt, the club members found that their opinion differed from that of the general public. The picture which the club had voted third place was awarded first by the sidewalk jury. The plan was sold to a drug store for the following month, with "Sunburn" as the picture assignment.

### Group Photo Tours Suggested

A sound suggestion for conserving tires and getting more fun out of picture jaunts is made in the *Squint*, quarterly publication of the Indianapolis (Ind.) Camera Club. The idea is for photographers to get together in groups of four or five, traveling in one car. It not only has its economical feature, but encourages an exchange of ideas and good fellowship.

### Unique Salon Held in Desert

From "Somewhere in the Middle East" by way of Frank F. Smith of Oxford, England, comes word of an unusual print exhibit prepared by members of the 16th British General Hospital Camera Club. With desert sand on all sides of them, these photographers found surprisingly many opportunities for interesting pictures. In addition to sunset pictures and studies of sand and sky, these camera enthusiasts found good material in nearby cities visited on leave. Their only regret was that the pictures could not be enlarged, due to lack of facilities, and had to be exhibited in contact size.

### Club Stages Photo Hunt

Members of the California Camera Club of San Francisco recently held a dawn-to-dusk photo hunt which was enjoyed by all participants. Assignments, in the form of picture titles, were drawn at the start of the program. Then the photographers went out to make prints to fit them, exercising a great deal of ingenuity. In the evening the finished prints were judged.

### We Hear . . .

THAT the *8-16 Club of Southern California* is interested in making movies of its section of the country for anyone sending them the film. Movies of Los Angeles, Hollywood, or any other places of interest will be taken, in black-and-white or color, 8 or 16 mm. Individuals or clubs desiring pictures from this area should communicate with Roy F. Willick, club president, 8920 Bandera St., Los Angeles, Calif. The 8-16 Club also is interested in exchanging ideas with other clubs.

*The Bennington* (Vt.) *Camera Club* would like to exchange shows with other organizations. Write to Mrs. Richard Hunt, secretary. Newly-elected officers of this club are Rueben Greene, president; Samuel Fortunato, vice-president; Mrs. Hunt, secretary; and Robert Van Surdam, treasurer.

Camera clubs in the vincinity of Buffalo, N. Y., have an opportunity to see a fine exhibit of prints by Wilbur H. Porterfield, on display at the Buffalo Museum of Science until October 1. These photographs were made by the carbon process, many of them shortly after the turn of the century, and are particularly interesting for the progress in printing that they show.

Monthly meetings have been continued through the summer by the *Lew-Burn Lens League* of Lewiston and Auburn, Maine. Officers are Joseph Sullivan, president; Henry Rawson, vice-president, and Joseph McGuckian, secretary-treasurer. The club is anxious to receive exchange exhibits from other clubs at any time. Correspondence should be directed to the secretary, 709 Main St., Lewiston, Maine.

The *35 mm Club of Boston* will soon have a bronze plaque, to be given to the winner of its advanced class in competition during the coming year. Made by Leonarde Craske, the plaque will portray Chester Crandell, first president of the club. It will be known as the Crandell Memorial Award. Officers for the coming year will be R. W. St. Clair, A.R.P.S., president; William Brigham, vice-president, and Miss Lilian Birrell, secretary-treasurer. Correspondence should be addressed to the secretary, care of Boit Dalton & Church, 89 Broad St., Boston.

*The Seattle Photographic Society* has elaborated on the usual print criticism sessions, with excellent results. The commentator for the evening, together with the judges, is given an opportunity to inspect the prints and become somewhat familiar with them before meeting time. John Lincoln, acting print director, reports that this procedure has worked out well, eliminating some of the strain the commentator works under in making extemporaneous criticisms.

The *Irvington* (N.J.) *Lens and Shutter Club* has its first exchange salon ready for traveling, and would like to exchange prints with other clubs. Those interested should write B. Fleetwood, print chairman, *Irvington Lens and Shutter Club*, 92 Ball St., Irvington, N.J. Gas rationing has resulted in improved attendance at meetings instead of a lapse, Edna Goetz, secretary, reports, and the club has become increasingly active. It has six members in the armed forces.

Members of the *Joliet* (Ill.) *Camera Club* have a studio under construction, and soon will boast a place where they can get together to make pictures with their assembled lighting equipment. Movie makers of the club, headed by Frank Dolasin, recently filmed the dedication of the war industry community of Lidice—named for a town leveled by Hitler.

Now that summer is over and clubs throughout the country are becoming more active again, it is time to check up and see what we are doing to help our war effort. We have heard from clubs which are photographing Red Cross activities, making publicity pictures in connection with the O.C.D. conservation programs, circulating exhibits among nearby Army and Navy posts, and making identification pictures of civilian defense officers. Let's make this column a clearinghouse for new ideas on how we can use our cameras to aid in America's war effort.—

## Popular Photography's Third Exhibit on Tour

AN outstanding collection of 100 prints from among prize-winners in the 1941 POPULAR PHOTOGRAPHY Picture Contest has been chosen to make up the Third Annual Traveling Exhibit. Plan to see these pictures when they are displayed near your home on their annual tour. For the next few months the salon has been scheduled for the following places and dates:

Annapolis, Md., Annapolis and Anne Arundel County Public Library, November 18 to December 2.
Cambridge, Mass., Massachusetts Institute of Technology, October 28 to November 11.
El Dorado, Ark., The Camera Club of El Dorado, September 16-30.
Elkhart, Ind., The First National Bank, September 16-30.
Harrisburg, Pa., James Lett Co., September 16-30.
Ithaca, N. Y., Ithaca Camera Club, November 18 to December 2.
Little Rock, Ark., Little Rock Camera Club, October 28 to November 11.
Lowell, Mass., The City Library, October 7-21.
Madison, Wis., University of Wisconsin, October 7-21.
Manchester, N. H., Carpenter Memorial Library, October 7-21.
Newark, N. J., Vailsburgh Camera Club, November 18 to December 2.
New London, Conn., New London Camera Club, September 16-30.
Nutley, N. J., The Free Public Library, November 18 to December 2.
Owego, N. Y., Owego Camera Club, September 16-30.
St. Louis, Mo., St. Louis County Schools, October 15 to December 2.
South Bend, Ind., South Bend Camera Club, October 28 to November 11.
Topeka, Kan., Free Public Library, October 7-21.
Tottenville, L. I., N. Y., The New York Public Library, October 28 to November 11.

## Second Exhibit Showing

The Second Annual Traveling Exhibit, made up of prints from the 1940 contest, is still being shown. It is scheduled as follows:

Aberdeen, S. D., Olwin-Angell, September 10-24.
Camden, N. J., W. L. Hurley Co., September 6-24.
Camp Cooke, Calif., September 10-October 13.
Camp Edwards, Mass., Service Club, October 19 to November 1.
Eugene, Ore., The Broadway, Inc., September 30 to October 13.
Fort Benning, Ga., Service Club, September 30 to November 1.
Fort Custer, Michigan, Service Club, November 7-21.
Fort Leonard Wood, Missouri, Service Club, November 8-22.
Fort Monmouth Service Club, November 1-21.
Fort Ord, Calif., Service Club, October 19 to November 21.
Fort Sill, Okla., Service Club, November 7-21.
Great Falls, Mont., The Paris Fiigman Co., September 30-October 13.
Greensboro, N. C., Meyer's Department Store, September 10-24.
Quincy, Ill., Photographic Society of Quincy, December 1-15.
San Diego, Calif., Walker's, September 10-24.
Winona, Minn., Winona Cine and Camera Club, October 19 to November 1.

## Fourth Exhibit Planned

Still another collection of fine prints, the Fourth Annual Traveling Exhibit, is now being planned. This show will be made up of prize-winning photographs from the 1942 POPULAR PHOTOGRAPHY Picture Contest, which is now being judged.

PICTURE BY FAMED JOE COSTA

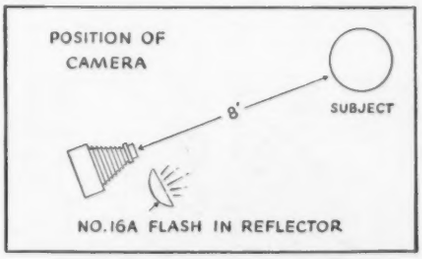
Flash by Westinghouse

JOE COSTA, one of America's most famous press photographers, has repeatedly won acclaim for his striking aerial pictures and "Front Page" action shots of disasters, fights, animals, and celebrities.

In the New York Press Photographers Association Exhibits, Mr. Costa has the unusual distinction of having won more awards than any other photographer. In this year's Show at Radio City, Mr. Costa walked off with two first prizes and an honorable mention.

**JOE COSTA SAYS:** "In my business, top-quality lamps are important. I use Westinghouse Mazda Photoflash Lamps because they give me the *uniform and dependable* lighting required for good pictures as well as the split-second accuracy so essential in press photography."

Take this worth-while tip from a top-notch, experienced photographer and use superior Westinghouse Mazda Photoflash Lamps to help you take superior pictures. They are precision-built lamps made to exacting standards of quality. Buy a supply of Westinghouse Mazda Photo Lamps from your dealer today.




**Here's how Joe Costa took the above picture**

4x5 Super Pan film, f./11 aperture, 1/200th second Camera 8 feet from subject. One No. 16A Westinghouse Mazda Photoflash Lamp in reflector attached to camera.

Westinghouse

MAZDA PHOTOFLASH LAMPS

# WHO'S WHO

**News & Comments about Photography and Photographers**

**Conducted by H. P. SIDEL, director of THE SCHOOL OF MODERN PHOTOGRAPHY**

## ● Debut!

Bowing in when so many of our daily likes, habits and sundry miscellany are on the way out "for the duration," this column makes its premier appearance on the photographic scene at a time when photography, contrary to general trend, takes on a greater and more significant role. On the immediate horizon, are brighter opportunities for photographers both in military and commercial work.

## ● God Bless the Ladies

The weaker sex assumes a man-sized job in photography. Judging from the increase in female enrollments at The School of Modern Photography (40% of total), "the women" have been quick to recognize their big moment. Straw in the wind is a report from the School's Graduate Placement Bureau which shows 95% of all fair sex graduates who desired professional work, placed in professional employ . . . AND HAPPY!

## ● Washington Notes

Late School of Modern Photography hopefuls currently up to their elbows in Government photography hypo are Edgar Hillyer (see photo opposite page), Esther Bubley, Doris Gibbs. Scattered in and out of the U.S.A., in army, navy and marine corps photography, are a small army of former students. Top ranking past student, Major Harold Blackstone, U.S.A. Air Corps.

## ● FREE—Portraiture, 1942 Style

Knocking the tried and true into a cocked hat has long been a pastime with dynamic John Hutchins, **(A.R.P.S.)**, famed instructor at The School of Modern Photography. His latest literary gem entitled "An Entirely New and Simplified Approach to Portraiture" tosses another bombshell into the ranks of the "toe-the-line boys."

Hutchins smashes all know-how rules for trimming down the size of the heavy-jawed portrait sitter.

Lighting methods receive a typical Hutchins blitzkrieg. High-key, a Hutchins specialty, comes in for some illuminating revelations. And nose shadow? Did you know there was a new trend? Hutchins says there is! As for glamour shots!—Hutchins debunks the hardships of this technique in one smashing paragraph.

Copies of "An Entirely New and Simplified Approach to Portraiture" are available free! Just drop a postcard to your columnist at The School of Modern Photography, 136 East 57th St., N.Y.C. (Use coupon for convenience.)

## ● Dots and Dashes

From our "Honored Again" Department, student "Joseph Brignolo," at recent one man show of his glamour portraits at Willoughby's.

Next month's column will examine "Victor Keppler on Assignment," a behind the scenes field trip with Keppler and students.

---

H. P. SIDEL,
THE SCHOOL OF MODERN PHOTOGRAPHY
136 East 57th St., N. Y. C.

Send me a free copy of John Hutchins' "Entirely New and Simplified Approach to Portraiture."

Name .....

Address .....

# Notes on the Salon Section

### PAGE 19—PICTURE OF THE MONTH

This unusual picture by Edward L. Hayes is the result of an intentional double exposure. He made both shots with a 3¼x4¼ Speed Graphic, on Eastman Super-XX film. The seated figure was photographed with an exposure of 1/200 second at *f* 16, using a red filter. Then the closeup was made, using 1/200 second at *f* 32 without a filter. Hayes is now a photographer, third class, in the U. S. Naval Reserve.

### PAGE 39—S. O. S.

This humorous picture was snapped by Leslie Aylor, Chicago news photographer, at Corpus Christi, Texas. The ensign actually was looking for his own hat, while eyeing those of the commanders with all the gold braid. The picture was taken with a 4x5 Anniversary Speed Graphic camera with 5" *f* 4.7 Kodak Ektar lens. His exposure was 1/100 second at *f* 22 with one No. 5 G.E. flashbulb, using Eastman Super-XX pack film.

### PAGE 40—FISHERMEN

Alex J. Cattanach took the dock scene with a 2¼x2¼ Automatic Rolleiflex fitted with 7.5 cm *f* 3.5 Zeiss Tessar lens. His exposure, in early morning sunlight, was 1/100 second at *f* 5.6 on Eastman Super-XX film, with an orange filter. The picture is one which he had planned for a long time before getting an opportunity to snap it. The scene is New York's Fulton Fish Market pier. Arriving before 7:30 a.m., he found a bleak mist in the air—too dark for pictures. Just as he prepared to leave, however, the sun broke through the mist for a moment and he caught a few exposures. This was the best of the lot.

Carola Gregor used a 2¼x2¼ Rolleiflex with 7.5 cm Zeiss Tessar lens for her picture of the fisherman mending his nets. It was snapped with an exposure of 1/100 second at *f* 11 on Panatomic-X film. The picture was made while passing by and enjoying the pictorial effect.

### PAGE 41—CONVOY

No technical data are available on these fine U. S. Army Signal Corps photographs, made by Larry Williams while enroute to Ireland with a troop convoy.

### PAGE 42—STILL LIFE

The picture featuring the Mexican bottle was taken by Leslie L. Johnson, using a 2¼x2¼ Korelle Reflex with 3¼" *f* 2.8 Zeiss Tessar lens. His exposure was 2 seconds at *f* 22 on Eastman Panatomic film, in natural daylight from a nearby window. It was actually a "candid" shot—the bottle, a Renoir print, and a Japanese print, happened to be standing together. Johnson recognized a good still life setup, and photographed them just as they were. Incidentally, the picture is his first still life.

Henry Inn also used natural daylight for his photograph of the Hawaiian cocoanuts. He took it with a 2¼x2¼ Super Ikonta B with 7.5 cm *f* 2.8 Zeiss Tessar lens. The exposure, with a yellow-green filter, was 1 minute at *f* 22 on Eastman Plus-X film. The cocoanuts came from Pearl City (near Pearl Harbor), and the picture was taken on Dec. 6, 1941.

### PAGE 43—MECHANICS

Howard Hoadley took the picture of instructor and pupil at a lathe with a 2¼x2¼ Rolleicord camera with 7.5 cm *f* 3.5 Zeiss Triotar lens. His exposure was 1/50 second at *f* 32 on Agfa Superpan Press film, with one Wabash Press-40 flashbulb fired in synchronization on an extension. The shot was one of a series he took for the Findlay, Ohio, *Republican-Courier* on an assignment to show the equipment of a new high school building and how it was being used. It was a prize-winner in the 1940 POPULAR PHOTOGRAPHY Picture Contest.

The photograph by H. Armstrong Roberts was taken with a 4x5 Graflex fitted with 21 cm *f* 4.5 Zeiss Tessar lens. His exposure, in natural sunlight, was 1/100 second at *f* 11 on Eastman Super Panchro-Press film.

### PAGES 44-45—CLOUDS

No technical data are available on this fine group of pictures by H. V. Lyle. His address was not marked on the backs of the prints, and when he sees them in this issue of POPULAR PHOTOGRATHY he will learn for the first time that they were accepted.

### PAGE 46—STUDY

Paul Heismann of Vista, Calif., took this picture with a 4x5 Speed Graphic equipped with 5¼" *f* 4.5 Zeiss Tessar lens. His exposure was 1/200 second at *f* 16 on Eastman Super Panchro-Press film. The picture is one of a series of nudes made while studying the use of abstract props to give depth, cast shadows for emphasizing form, etc.

### PAGE 47—READY

Zia Qadri took the picture of the photographer at work in a studio setup to fill an assignment at Art Center School, Los Angeles, Calif. He used a 4x5 Korona View camera with 10" *f* 4.5 Zeiss Tessar lens. His exposure was 1/5 second at *f* 16 on Eastman Super-XX film, with two Baby Keglite spots for main lighting and one floodlamp for fill-in. The model is Ted Barnaby.

Frank Ubhaus' picture of Fred Archer also was made at Art Center School, where Archer is chief instructor of the photographic department. The shot was made on location, using a 4x5 Series D Graflex with 8¼" *f* 4.5 Zeiss Tessar lens. The exposure, using Eastman Super Panchro-Press film, type B, was 1/25 second at *f* 22 in bright sunlight, with a medium yellow filter. Archer is shown using a Korelle Reflex with 7" Cassar lens in special focusing mount. Ubhaus is now a member of the U. S. Army Signal Corps.

### PAGE 48—SMOKE

George M. Johnson's fire picture was taken at an oil refinery plant. He used a 2¼x3¼ Kodak Six-20 with 3½" *f* 4.5 Kodak Anastigmat lens. His exposure was 1/25 second at *f* 4.5 on Agfa Super Plenachrome film, in early morning light. The picture is one of a series he made during the blaze, and he was fortunate enough to catch an explosion of a gasoline tank in it. This accounts for the flames in the smoke. He gave liberal exposure, and cut the developing time almost in half to avoid contrast, which might have obscured the flames.

Newton Hartman photographed the old man smoking a cigar on a newspaper assignment to illustrate a feature on the centenarian. He used a 4x5 Speed Graphic with 5¼" *f* 3.5 Zeiss lens. His exposure, on Ortho Press film, was 1/200 second at *f* 11. Two G. E. No. 16A flashbulbs were fired in synchronization, one at the camera and the other behind the subject to give backlighting to the smoke.

### PAGE 49—FIRST AID

Both these pictures by H. Armstrong Roberts were taken with a 4x5 Series D Graflex. The shot of the little girl was made with a 21 cm *f* 4.5 Zeiss Tessar lens on Agfa Triple S Pan film, with an exposure of 1/60 second at *f* 11. The lower picture was taken with an 18 cm Kodak Anastigmat lens. The exposure was 1/60 second at *f* 16 on Eastman Super Panchro-Press film with a medium yellow filter.

### PAGE 50—SEA FOAM

Fritz Henle of New York, N. Y., made this picture in unusually heavy foam he found along a Florida beach. He used a 2¼x2¼ Rolleiflex camera with 7.5 cm *f* 3.5 Zeiss Tessar lens. The exposure was 1/500 second at *f* 8 on Superpan Supreme film, with a light yellow filter.

### THE OCTOBER COVER

**This month's cover illustration was reproduced from a 5x7 Kodachrome transparency made by Paul Garrison of New York, N. Y. He used a 5x7 Eastman all-metal view camera fitted with 14" *f* 9 Goerz Apochromat-Artar lens.**

**The exposure was 2 seconds at *f* 16, with a 5000-watt white spot for front lighting and a 2000-watt blue spot at the side and back. The subject is Blanche Grady, a Powers model.**

## Squeegeeing Negatives

A SAFE, simple, and efficient method for removing the surplus water from negatives before they are hung up to dry is to use the flat type of rubber squeegee

Squeegeeing film avoids water spots.

and an ordinary ferrotype tin or sheet of plate glass. As shown in the accompanying photograph, the negative is placed emulsion side up on the tin or glass, and the water is swiped off with the squeegee. Then turn the negative over and repeat the process. Turn it over once more, wipe the squeegee off with a piece of clean chamois or a cellulose sponge, and perform the squeegeeing process a third time. Then hang the negative up to dry, and it will be free of annoying water marks.

Undoubtedly, it seems as though this method would invite abrasion of the negative. With clean water and a complete absence of dirt or dust on your squeegee and ferrotype or glass, there's nothing to fear on this score. We have used the method for six months, handling hundreds of negatives in this way, and have yet to see any scratches. Our negatives are made on sheetfilm and filmpack and are put through an ordinary chrome alum hardening bath in the usual manner.—*Paul D. Steffee and Walter R. Scott, Mobile, Ala.*

## "Light-Proofs" Shiny Upright of Enlarger

A GOOD many amateur enlargers are equipped with uprights or posts which have highly polished metal surfaces. This shiny metal introduces a real possibility of fogging the print by means of light reflected from easel to upright to printing paper. It's easy enough to eliminate this danger by wrapping the lower portion of the upright with some black, non-reflecting fabric, as indicated at point A in the accompanying sketch. Black felt or black matte paper will do a good job, or you may even want to use a flat black paint for permanence.

Non-reflecting post.

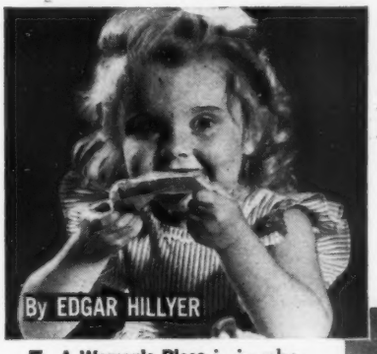

# PHOTOGRAPHY

## The "MODERN" Way

**1. Modern Instruction** at THE SCHOOL OF MODERN PHOTOGRAPHY is producing a new crop of photographers whose work is fresh, thoroughly professional. Typical is the work of ED. BOONE (*right*). A "*Class of '42*" graduate, Boone is now photographer for the Beech-Nut Packing Co.

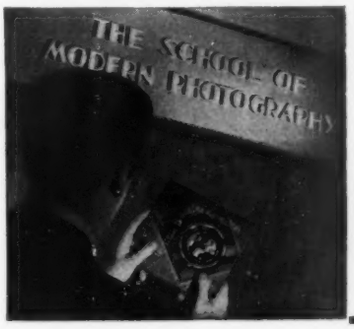
**2. A Tribute** to the reputation of THE SCHOOL OF MODERN PHOTOGRAPHY as "*America's Finest*" school is the number of professionals, men like ARTHUR SELBY, N.B.C. photographer, (*see left*) who come to this school to study advanced technique under such masters as famous ad photographer VICTOR KEPPLER, dynamic camera stylist, JOHN HUTCHINS, master of portraiture, HELENE SANDERS, noted news cameraman, ROY PINNEY and others of the School's star-studded faculty.

**3. To Up-and-Coming Student** MARIA TAMARKINA goes deserving praise for this exceptionally professional flash shot of hero, Lt. Commander Bulkeley. Says a leading news photographer, "It's a honey—worthy of rank with the best we in the business got." Following usual procedure, the School's highly regarded graduate placement bureau will find professional work for talented MARIA TAMARKINA upon completion of her courses.




**4. That Certain Something** is evident in this appealing photo, one of a large portfolio of excellent studies by EDGAR HILLYER, a professional photographer before enrolling at THE SCHOOL OF MODERN PHOTOGRAPHY and now a Photogrammetry expert with the War Department. To amateurs employed at other work and working photographers, the School's personalized instruction makes it possible to fit study courses to individual requirements. Since there are no classes, day or evening courses may be started at any time in COMMERCIAL ADVERTISING, NEWS, PORTRAITURE, COLOR AND BASIC MILITARY PHOTOGRAPHY. *Tuition costs are very moderate!*

**5. A Woman's Place** is in photography. So thinks charming MRS. JOHN L. RICHARDS (*right*) photographer and writer for a leading newspaper. In her leisure time, Mrs. Richards found study at the School both refreshing and valuable. Like many women, Mrs. Richards realizes that photography offers women its greatest opportunity now.




**6. "The Training** I got at the School was instrumental in my appointment as an air force photography instructor," writes DICK BUCKWALD, recent graduate. More than 50 other graduates have qualified for "non-com" officers' ratings as Army & Navy photographers.

**7. Fascinating Free Book**—60 pages detailing courses in COMMERCIAL ADVERTISING, FASHION, PORTRAITURE, COLOR, NEWS; faculty biographies, equipment views and portfolio of prize-winning photographs, many in color. *Write H. P. Sidel, director—Dept. P 10.*

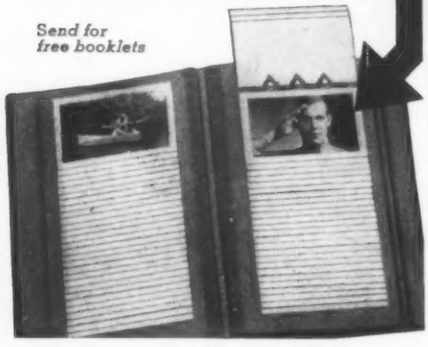
THE SCHOOL OF MODERN PHOTOGRAPHY
136 East 57th St. New York City

NOW MORE THAN EVER
YOUR SNAPSHOTS
NEED *Protection* TOO!

For you at home—for loved ones away, FOTOFOLIO keeps precious snapshots permanently safe—a joy to review. Simple to use—each page holds 28 snapshots in orderly sequence. There are attractive FOTOFOLIO models from $1 to $10. Ask for them by name at leading stores. *See the Army and Navy FOTOFOLIOs—perfect gift for Service men.*

FOTOFOLIO
Reg. U.S. Pat. Off.
E. E. MILES COMPANY, Box 22, So. Lancaster, Mass.

*Send for free booklets*



FREE BOOKLET
FOR THOSE WHO TAKE PICTURES
Color • Black and White

Tells how to get . . .
Consistent, exacting exposures under all light conditions.

Extreme low light exposures that are always correct.

True-natural color pictures. Sharp in focus results.

Explains why and how Phaostron electric exposure meters and military type range finders help amateurs get professional results. Write today.

PHAOSTRON CO.
5 South Granada Ave., Alhambra, California

# TABLETOP SILHOUETTES

by R. LOYD FAUQUIER

FOR unusual trick pictures that will keep your friends guessing, try tabletop silhouettes. These pictures are surprisingly easy to make, and setups require very little material. The accompanying illustration was made with an old mounting board, a sheet of tracing paper, some black paper, a few pins, cellulose tape, and a cardboard carton.

Cut-outs were mounted on the front of a cardboard box to get this tabletop setup.

In making your props, remember that the relative sizes of different objects in the scene must be kept correct to preserve the illusion. If all parts of the setup are not in proportion, the trick will be given away at once.

The casement window first was drawn on the mounting board, and the window openings were cut out with a razor blade. Next, tracing paper was fastened on the reverse side of the board, covering the window, with a few strips of tape. This was done to add realism to the finished print — otherwise the cut-out model would have appeared flat and readily discernible as a cardboard figure, destroying the illusion of reality.

The cut-out figure of the girl and that of the potted plant then were prepared and glued in place. You can find plenty of materials for use in this manner in magazine illustrations, if you don't want to draw your own. Choose suitable figures, cut them out, and mount them on light cardboard.

Ordinary writing paper was used for the drapes, with folds drawn in pencil. Paper was substituted for cloth because the coarse weave of any material at hand might have given the trick away, although very fine cloth might have been more effective.

The balcony was drawn on another piece of cardboard, cut out, folded, and fastened to the front side of the mounting board with cellulose tape and a few straight pins. The arched window casing is another strip of cardboard, fastened in the same manner.

The remainder of the white mounting board, outside the picture area, was covered with black paper. This kept light from being reflected to reveal the cardboard structure, and also helped give the illusion of darkness outside the lighted window.

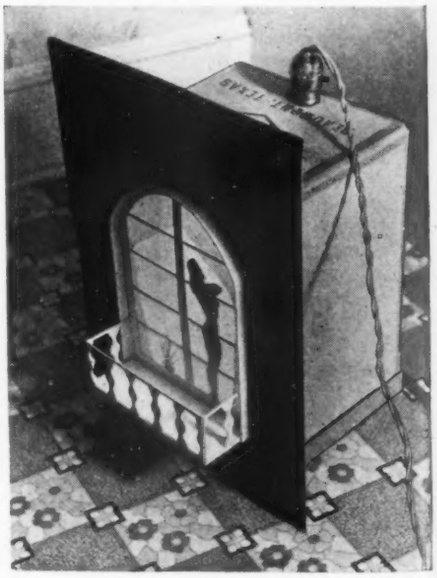
To provide proper illumination, a hole was made in one end of a cardboard carton and a socket containing a 15-watt lamp was inserted. The complete silhouette was placed over the open end of the box and fastened in an upright position with a few pins. This completed the setup, which was photographed in the darkroom to avoid any light other than that from the enclosed bulb.

There are many other types of setups you can use for interesting tabletop silhouettes. It is easy to arrange inexpensive figures before a background that is lighted from behind. Tracing paper is excellent background material for this purpose, and can be suspended from a wooden frame or from one fashioned out of cardboard. Large calendar illustrations, lighted in such a manner that the figures remain in silhouette, also can be employed effectively.

Doorways, windows, and trees are fine props to help give silhouette pictures of this sort a frame within themselves. They should be made of black paper, and placed between camera and background so that no light falls on them.

Once you get working with tabletop silhouettes, many ideas will occur to you. There is no limit to the setups you can create, using props that can be made easily or found around the house.—

This picture reveals details of the setup, which can be used for many novel effects.



## Press Flashes

(*Continued from page* 10)

Barber has switched from the society desk to the photographic staff. Gwen Rogers Olmsted succeeded her husband as staff photographer on the Chattanooga, Tenn., *Free-Press* when he joined the Army Air Force, and Mrs. Lucy Deerin, Columbia, S. C., *Record* reporter is taking up photography.

• • •

THE Marines are giving the pix shooters a real break. Classes have been enrolled in groups including photographers and correspondents, who will be enlisted as privates and sent to the base at Parris Island, S.C., for basic training. After they have learned the rudiments of Marine Corps life they will be transferred to Quantico, Va., where instructors will coach them in the application of their civilian skills to military life. When courses have been completed, the specialists may be assigned in groups —a reporter, a still photographer, and a newsreel man—to Marine units, and they will move with their unit wherever it goes. While on duty, it will be their task to gather general military news and photographs for distribution to the press, through the office of the commanding officer, and to prepare material for transmission to Marine headquarters in Washington.

• • •

EDWARD Salamony, Pittsburgh *Sun-Telegraph* photographer, won the fifth annual photographers' contest conducted by Transcontinental and Western Air, Inc., and received $100 in addition to a plaque. His photo, "Airport Interview," showing Mrs. Eleanor Roosevelt surrounded by reporters and photographers, won him top honors. Lloyd S. Jones, Youngstown, Ohio, *Vindicator* staffer, was second, and Robert Seelig, New York *News*, placed third.

• • •

THE President is quick with his sallies—as was proved recently when a photographer who asked the President to wave at him got a verbal kick in the shins. "What's that?" asked the President, after the lensman had asked him to pose waving his hand. "I'll wave at you," the President told him, "when you're in uniform, passing by."

• • •

THE game isn't always over—for newsmen and photographers—when the last man is out. This was demonstrated recently at Pittsburgh after the Pirates and Cardinals played an exciting extra-inning night game. *Associated Press* Staff Photographer Jack Harris, noting a commotion near the Pirate dugout, hurried over and got an exclusive shot of an irate Pirate fan being tossed out of the dugout by an umpire. *AP* Editor Gib Staley, a spectator at the game, saw the flash from Harris' bulb while making his way out of the park. He rushed back to the dugout and got the story of the squabble.—

*Except for the small supply now available at dealers, there will be no more* WESTON *Exposure Meters for the duration.* WESTON *instruments are vitally needed for the more important job. But shortages need not trouble fortunate* WESTON *owners. For with reasonable care your Exposure Meter will give you the same "years of dependability" which has kept* WESTON *Instruments the unchallenged leaders throughout science and industry for over half a century.*

"A package of film has always *gone farther* since I owned my Master" states this professional. "Until recently, however, I thought mainly of *correct exposures* and little of film conservation. But to-day, a photographer needs the film-saving advantage of the Master. Its extreme accuracy, and the WESTON Exposure dial that enables you to get exactly what you want on each negative, saves plenty of film and gives it double-value in these less-plentiful days." Weston Electrical Instrument Corporation, 644 Frelinghuysen Avenue, Newark, New Jersey.

**WESTON** *Exposure Meters*

**BUY** WAR SAVINGS BONDS AND STAMPS! **BUY** NOW! **BUY** MORE! **BUY** REGULARLY!

TRADE MARK REG. U.S.PAT.OFFICE.

**NUACE**

*Photographers Prefer!*

NuAce Mounting Corners for mounting photographs, portraits, and other items. NuAce corners allow you to remove or replace items at will.

Regular Junior and Senior sizes. In Black, White, Green, Red, Gray, Gold, Sepia, Ivory and Silver. Also crystal - clear Transparent style (medium).

Get NuAce at your dealers or send 10c for a package and samples.

14 Gould St. ACE ART CO. Reading, Mass.

Free in WARDS 1942 CAMERA AND COLOR CATALOG

**12 Helpful Hints to Better COLOR PHOTOGRAPHY**

You'll be amazed at Wards variety of everything photographic. Dozens of new items photographers demanded. Wards Low Prices prevail on all still or movie cameras, projectors, accessories, supplies.

**Low Prices For Cash or Terms Orders**

Buy anything you want now—pay later. Wards time payment plan eliminates carrying charges on most orders. Most items sent POSTPAID and every purchase guaranteed to satisfy. Act NOW! Get this money-saving FREE Book. Write today.

This is the Book You Need to Take More and Better Color Pictures

**MONTGOMERY WARD**

Photographic Dept. PP-1042-B Chicago, Ill.

*It's a*

**BIG HIT**

*with Photo Fans!*

**THE NEW**

**G-E**

**PHOTO DATA BOOK**

*(more than 50,000 of the 1940 edition in use)*

***New 1942 edition, completely revised, now ready***

**TELLS** how to use your meter to make every shot count.

**SUGGESTS** easy short cuts to better printing and enlarging.

**EXPLAINS** how to make metered-flash shots—how to control photo backgrounds.

You'll like this handy guide to better pictures! Its 112 pages are full of practical picture-making tips, useful tables, essential technical data, and helpful suggestions covering all angles of black-and-white and color photography. Actual size, 3 by 5 inches.

You'll want to use it often to check film speeds, developing formulas, flash exposures, paper speeds, filter factors, and other data essential to good picture making. Fifty cents at your dealer's. *General Electric, Schenectady, New York.*

★ ★ ★

**If your dealer cannot now supply you with a G-E exposure meter, here's the reason: Materials and facilities are needed to produce equipment for our armed forces and vital war industries. Our efforts are being expended to speed VICTORY for the United Nations. We know you'll understand.**

**GENERAL ELECTRIC**

606-129-6336

## The Truth About Wetting Agents

*(Continued from page 26)*

They reduce the danger of airbells on the film during development, they prevent the formation of water spots during drying, or decrease their number, they aid in retouching and coloring, and they effectively clean glassware, negative carriers, etc.

They do not prevent uneven development and streaks, or decrease developing, fixing, and washing time. Improperly selected wetting agents may cause mottle and foam marks, leave a scum residue on drying, cause fixing bath scum, or precipitate in hard water.

Wetting agents are of some advantage in the developer, but their action is only supplemental to the very considerable wetting power of the alkalies which are already present. This increase in the wetting power is of most value in the prevention of "airbells." These are formed if a film which has been only briefly immersed and not completely wetted is re-exposed to air by withdrawing the film or shaking the tank. Bubbles of air may then collect on these unwet portions; or the bubbles may have been mechanically entrapped by the developing reel and held on the dry areas of the film.

Since the developer is unable to reach the surface where the bubble (airbell) clings, a clear spot is left on the film, giving a black spot on the print. Wetting agents reduce the number of dry areas to which a bubble might adhere. Among the practical wetting agents for this are Aerosol-AY and Kodak Water Spot Preventive. Aerosol-AY is best employed at about 0.2 gram per liter (3 grains per quart) and the Kodak agent, at about 0.4 gram per liter (6 grains per quart).

If a film is not completely immersed in a developer—as in the case of a thin layer in a tray, the solution spreads irregularly over the surface unless it is vigorously agitated. Although a wetting agent slightly accelerates this rate of spreading, the improvement is unimportant compared with that effected by changes in agitation and method of immersion. Similarly, streaks occurring during development are controlled mostly by agitation and only slightly by wetting.

Negative drying is the next stage of the photographic process in which wetting agents are of real value. Very thorough squeegeeing or sponging of the film are necessary in normal processing if drying marks are to be avoided consistently. They are caused by drops and streamers of water which stretch the gelatin and distort the image under the areas which they have covered. Water spots are frequently unnoticed in areas broken up by an image, but they show up clearly in any area of solid tone.

Wetting agents prevent these marks by spreading the water out into a thin layer which dries rapidly and uniformly. A great many wetting agents can be employed for this purpose. Among those recommended are a 0.1 per cent solution of Arctic Syntex-T, Aerosol-OT or Aerosol-AY, or the Kodak Water Spot Preventive.

Improper wetting agents may become a source of trouble in the developer and they can also give difficulty in drying. Some wetting agents produce a severe, tenacious foam, which is to be avoided. Others leave a scum residue. It is difficult to find an agent that will leave the base side of unbacked film free from all spots and streaks. However, these can be carefully removed from the dried film with slightly damp absorbent cotton.

Dried negatives and glossy-surfaced prints, particularly when at all oily, are difficult to retouch and to color. Wetting agents are of very real aid here. They can be incorporated into the retouching fluid, but are more conveniently applied to the print or negative with a cotton swab followed by a water rinse before coloring. Nearly any wetting agent is suitable for this use at a concentration of about 0.1 per cent. Ammonia, which like other alkalies is a wetting agent, is especially useful.

Wetting agents do such a very good job of cleaning printing frames, glass negative carriers, and other chemical glassware that this use should be mentioned. A 0.1 per cent solution is suitable, but higher concentrations may be necessary if the glassware is very greasy. Strongly foaming wetting agents such as Dreft, obtainable at grocery stores, are very effective for this purpose.

A hot water rinse is not always necessary, but is frequently helpful. Thorough rinsing should follow washing. Wetting agents also can be used to clean greasy, finger-marked film. After the grease has been removed, the film is rinsed well and dried in the usual manner.

We have seen that wetting agents are of help in development by reducing airbell formation, that they prevent water spots in drying, and that they are of use in coloring, retouching, and cleaning. They must be selected carefully, for use in developing and drying. Requirements are less rigid for coloring, retouching, and cleaning.

Several hundred wetting agents are available, and their use in photography, as such, is relatively new. Extension of research can be expected to result in improvements that will increase their value in photography.—

## Local Intensification

WHEN intensifying a negative, there may be certain portions upon which you do not wish the intensifier to act. Cover these with rubber cement applied with a soft brush, and let the cement dry thoroughly. Then immerse the film in the intensifier as usual. When the desired stage has been reached, rub off the cement very gently, and your negative should print just about as desired.—*Alta E. Washburn, Sierra Madre, Calif.*

# Contests and Markets

A NATIONAL War Poster Competition, with eight $300 war bonds as prizes, has been announced by Artists for Victory, Council for Democracy, and Museum of Modern Art. There is no restriction as to medium to be used. Photography and graphic art can be combined or used separately. The competition program and entry blank will be mailed on request to any artist or photographer. Requests and inquiries should be addressed to National War Poster Competition, c/o Artists for Victory, Inc., 101 Park Ave., New York City. Entries must be sent to that address so that they will arrive no later than October 15, 1942.

ELK STUDIO, Elkton, Maryland, is in the market for original 35 mm Kodachrome transparencies of outstanding quality and general interest. Payment is from $1.00 up for transparencies selected. Submit only high-quality 35 mm slides that have interest value for a wide range of people.

FIELD & STREAM, 515 Madison Ave., New York, N. Y., is in the market for action shots on all phases of hunting and fishing, and also for decorative outdoor shots for use as backgrounds, such as cloud formations, water, foliage indicating seasons of the year, etc. Rates are $3.00 for photos which can be used merely for backgrounds or superimposing, $5.00 for the general run of outdoor photos, and as high as $15.00 for unusual pictures of fish, wildlife, and fishermen or hunters in action.

CAMP FIRE GIRLS, Inc., 88 Lexington Ave., New York, N. Y., has announced its third annual picture contest. All members are eligible to compete. Pictures must first be submitted in local contests, except where no local contest is held, when they can be sent direct to national headquarters. Closing date for entries in the national contest is Sept. 15.

## Trade Notes and News

(*Continued from page 58*)

from various military and government agencies. Mr. Emmet E. Shipman, one of the midwest's leading commercial and free-lance photographers, will head the new department.

A FLASH installation for Graflex cameras is announced by the Kalart Company, Inc., 915 Broadway, New York City. It permits synchronized flash at from 1/500 to 1/1000 second, with curtain shutter. Cost is $10.00 plus transportation, for unit and installation, and $20.00, plus transportation, complete with Kalart Master battery case, reflector, and attachment clip. Any Kalart battery case can be used with the unit. Installation is made only at the Kalart factory, 114 Manhattan St., Stamford, Conn.

MARKETED under the name "Laffbuilders," a series of selected Gutlohn cartoons and comedies are now made available to home movie users by Certified Films, Inc., 25 West 45th St., New York City. The films are obtainable in 8 mm silent and 16 mm silent and sound.

SEVERAL DESIRABLE features are incorporated in the new plastic sheet film and pack film hangers being offered by Raygram Corp., 425 Fourth Ave., New York City. The hangers are made of shock-resistant plastic. A bar drops into position and locks the film, so that it will not float out when agitated in solutions. Prices are as follows: 3¼x4¼ sheet film or pack film hangers, 75c each; 4x5, 80c each; 5x7, $1.00 each.

ECONOMICAL FILM SERVICES of various types are offered by the Spiratone Fine Grain Laboratories for amateur and professional photographers who desire something more than mechanical processing of films. The address of Spiratone is 49-55 West 27th St., New York City.

A NEW SERVICE announced by Eastman Kodak Company now makes it possible to have enlargements made from selected portions of Kodacolor negatives. The area to be enlarged can be outlined with Scotch tape applied to the glossy side of the negative. It will be printed so that the smaller dimension will be enlarged to 2⅞ inches.


Sharp focus
Perfect composition
Correct exposure

You sight and focus thru ONE eyepiece

These are three fundamentals of which you'll never be in doubt when you shoot with a Contax III or Super Ikonta BX.

A long-base range-finder, with *one solid prism,* insures permanent accuracy of focus. This range-finder is optically combined with the view-finder, enabling you to sight and focus through *one* eyepiece—a new aid in obtaining perfect composition. . . . And you're never caught without a meter—it's built into the camera. Every shot can be exposure checked.

Carl Zeiss Lenses are standard with both cameras —and you know what that means when you're after those subtle pictorial qualities that make a photograph really outstanding.

CONTAX III
AND
Super Ikonta
BX

*See Contax III and Super Ikonta BX at your dealer's.*
*Write for Literature*

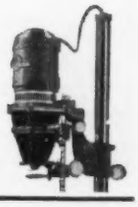
CARL ZEISS, Inc.,
Dept. C-17-10
485 Fifth Ave.
NEW YORK
728 Hill St., Los Angeles

*Photography by Richard M. Stevens, Chicago, Illinois, Prize-Winner, DeJur International Photography Contest.*

YOU may be sure of perfect performance when using your DeJur "Critic" Exposure Meter and your "Versatile" Enlarger. Today, when you turn to photography as a recreation, it's good to know that these two instruments can so immeasurably add to the enjoyment of your hobby.

WELL WORTH WAITING FOR

We're mighty busy these days helping to supply our Armed Forces with vital materials . . . so you may not be able to obtain a DeJur Enlarger or Exposure Meter promptly. However, they're well worth waiting for.



DeJur-Amsco Corporation Shelton, Connecticut

35mm FILM
ultra FINE GRAIN
DEVELOPED
AND
VAPORATE TREATED
FOR YOUR FUTURE PROTECTION
25¢ PER ROLL

DEVELOPING • VAPORATE
and 3¼" x 4½" GLOSSY
ENLARGEMENTS
36 Exp. Roll $1.00 • 18 Exp. Roll 75c
•
10% Credit Coupon Plan Now in Effect
•
8 Exposure Roll, FINE GRAIN
DEVELOPED & PRINTED
25c per Roll • 12 Exp. Roll 40c
•
We Offer a Complete Finishing Service Including—
POSITIVE PROJECTION TRANSPARENCIES.
DELUXE ENLARGEMENTS, ETC.
•
FREE ON REQUEST
COMPLETE PRICE LIST and MAILING BAG
OUR GUARANTEE IS YOUR PROTECTION
YOUR MONEY REFUNDED IF NOT
ENTIRELY SATISFIED.
•
SINGLE FRAME • MEMO • UNIVEX FILM
ENLARGED TO 2" x 3"
Please Remit With Order To Save C.O.D. Charges
DEVELOPIX
Flatiron Bldg., New York, N. Y.

★ FINE CAMERAS
AT POWELLS

- Powell does it again! Super values in the finer types of Cameras at money-saving prices.
- FILMO 70DA, three lens turret with Cooke 1", F1.5; Acura 2", F2.8 and Dallmeyer 3", F2.9 lenses. Variable optical view finder. Deluxe case with zipper overcase. Guaranteed like new, only $425.00.
- Ann. Speed Graflex 4 x 5" with Zeiss Tessar 135mm, F4.5. Press Compur. Hugo Meyer Range Finder. Mendelsohn flash. Like new only $180.00.
- Korelle-Reflex Model 2 with 8cm., F2.8 Zeiss Tessar and case. Like new, only $147.50.
- Graflex Ser. B 4x5". Rev. back. With 7½", F4.5 K.A. Like new, only $125.00.
- Ampro Model S, 16mm. Sound Projector. Factory recon. and guar. Two cases, only $285.00.
- Solar Model 4 Enlarger 3¼x4¼ with 3½", F4.5. Floor sample, only $54.40.
- Solar 4 x 5. Less lens. Floor sample, only $49.40. Hundreds of other values in fine cameras, supplies and equipment. Write for prices.

POWELL'S CAMERA MART
153 W. Randolph St. Chicago, Ill.

FINEST FINISHING
FOR ONLY 25c MORE
Pay a little more for extra quality, extra care — your insurance against disappointment and loss of pictures.
Any 35mm roll (incl. Univex) ultra fine grain developed, vaporated and 36 outstanding enlargements 3¼ x 4½ ..... $1.25
18 ex. rolls ..... 1.00
Reprints, each ..... .04
Reloads (36 ex.) .$0.50 3 for 1.35
Any 8 ex. roll 120, 620, 127, 828 Bantam (except 116 and larger) ultra fine grain developed and enlarged to 3¼ x 4½ ..... $0.50
16 ex. split rolls (incl. 116) .75
12 ex. split rolls (enl. to 4x4) .75
Reprints, each ..... .05
Write for free folder and mailing bag, or better—send your film today.
Beta Photo Laboratories
Box 745, Grand Central Annex, New York, N.Y.

## Filming Milk...From Cow to Kitchen

(*Continued from page 57*)

can do this nicely. Then return to an evening shot showing the empty bottles being deposited on the back doorstep.

This needn't end your picture, by any means. No matter where you live, it's likely that you can find some grazing cows within a few miles, and you can dissolve from the row of empty bottles to a long shot of cows in a meadow. Or you may prefer to film just a single cow, going in for a closeup. A herd often will afford better picture possibilities, however, especially if you can frame it with leafy trees.

If you've been able to make a deal with the farmer, you can start with a highway sign with the name of the farm on it, swinging over to a pictorial long shot of the farm itself. Bring the camera in close to show the cows entering the barn. For a novel effect, step well inside the barn and frame a silhouette through the door, with the herd filing in one by one and entering the individual stalls.

Next, you'll want some scenes of the milking. You can show a milking machine being attached, and then use a closeup to show it working, with the streams of milk filling the pail. Here you have a chance to secure some interesting lighting effects. You can, for example, put a No. 2 floodlamp in a revamped kerosene lantern, setting the latter on the barn floor. If you happen to be shooting in Kodachrome, put some yellow cellophane around the lantern and it will give off a typical glow. With color film, however, you must be careful about letting both daylight and artificial light register in the same scene, unless you're using daylight bulbs with daylight Kodachrome.

Most of your milking scenes will have to be of the "off-the-cuff" variety, and you must learn to set up and shoot quickly and effectively. Farm people are busy people, and you can't expect retakes on any given occasion. The routine is invariable, and you'll have to film it as it happens or not at all.

Finally, the milking machine is removed, and you pan upward to follow the farm-hand as he walks into the milk shed and empties the pail into the cooler. Follow the tiny streams of milk as they pass over the cooling coils and drain into the container, and show one workman taking a temperature reading with a thermometer.

The loading of the full milk cans onto trucks can be filmed at dusk, while the sky still glows, with the figures of the workmen and the milk cans themselves appearing in silhouette. You can fade this out and then come back to early-morning scenes of tall buildings, the milk wagon, and the driver making deliveries. The picture can be completed in this way, if you wish.

But let's assume that you want to include the processing and bottling of milk in your film. Every city has milk plants, and most small communities have local dairies. It's entirely possible that the management of one of these establishments will let you shoot some footage inside. If so, you can make your picture more detailed and more interesting, especially if you take plenty of film with you and make good use of it.

The logical place to start this portion of the film is immediately following the milk-can sequence on the farm. Perhaps you can get some shots of revolving truck wheels, swiftly-passing highway, and the truck-driver himself to denote the transition from farm to bottling plant. Then, instead of going into the city-delivery footage mentioned previously, you can show the truck pulling up to the loading platform of the plant.

Inside the plant you'll find enough to keep you busy for a long time. The milk cans go onto a moving belt, and each can is sampled, weighed, dumped, and steam-washed. Pasteurized milk is run from huge vats into coolers. Then it is bottled, capped, placed in cases, and stored in a big refrigerated room to wait delivery. All this is interesting picture material. The butter and ice-cream departments and the laboratory in which the dairy products are tested are likely subjects, too. The bottling and capping operation probably will furnish you with some of the best sequences.

In shooting interiors of this kind, you'll find it helpful to have some floodlamps in reflectors with you. In this regard, see to it that all light cords are waterproof and all connections well taped, because there's apt to be water running around the floor of a milk plant, and a short-circuit will occur if you're careless. The extremely humid air isn't very good for cameras and equipment either, and you should wipe them off thoroughly before packing them away. Watch that your lens doesn't become fogged with condensed moisture while you're working inside.

Naturally, you must not get in peoples' way. If you see that it's going to

"Let's run it through just once more before we censor it."

cause the workmen inconvenience to plug in a light at a certain location, skip it. The more closely you cooperate with people and the less you disturb their working routine, the better.

Watch your backgrounds, to keep them from being distracting. And make free use of medium and close shots, as well as closeups. The latter can be especially helpful in telling a film story of this type.

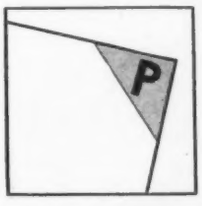
When you've covered the milk plant—and to do a good job it may take you longer than you expected—you can get some footage showing the drivers loading to start their routes. Then you can get into the early-morning sequences described previously, taking the continuity on from there.

To sum things up, you don't need the milk-plant footage in order to have a good film story, and you may not want to bother with it. On the other hand, if you want to go after it and can make the necessary arrangements, you'll have a real feature when you're through. Similarly, the dairy farm sequences aren't absolutely essential. They're somewhat easier to get, however, and anybody should at least be able to work a cow or two into the picture.

Actually, you can do a good job with just the milkman as the main character, following the simple script suggested toward the beginning of the article. Judicious editing and titling can make a "quickie" like this into real entertainment. The more work and effort you want to put in on a documentary film of this kind the more complete it will be. But regardless of how elaborate a script you use or whether you choose color or black-and-white film, you'll have a lot of pleasure filming the story of your daily bottle of milk.—

## Marking Print Envelopes

MOST amateurs eventually collect quite a number of prints which they do not want to throw away for various reasons, yet which become difficult to keep in order. A good solution to the problem is to sort the pictures out according to size and subject matter and then put them in discarded envelopes in which printing paper has been purchased. These envelopes then can be kept in file drawers or cardboard boxes for greater convenience.



Corner-mark aids in quick identification.

The sketch here shows a simple method of identifying the various envelopes without actually pulling them out of their container. Set up some simple kind of key system, in which letters of the alphabet represent certain picture classifications. Portraits, for example, might be indicated by the letter "P," and all envelopes containing portraits would have this letter marked plainly on the upper right-hand corner. When you want to locate a certain type of picture, all you need to do is riffle through the corners of the envelopes until you come to the right letter.—


ABE COHEN'S EXCHANGE, INC.

VALUE PARADE of USED CAMERA BARGAINS

| | |
|---|---|
| 35 mm. Baldina, F2.9 Trioplan, Compur | $ 37.50 |
| 35 mm. Leica Model F, F2 Summar | 124.50 |
| 35 mm. Leica Model G, F2 Summar | 159.50 |
| 35 mm. Leica Model C, (Box only) | 35.00 |
| 35 mm. Perfex No. 44, F2.8 Scienar | 32.50 |
| 35 mm. Univex Corsair II, F4.5 Anast. | 14.50 |
| 35 mm. Robot II, F2.8 Zeiss Tessar, case | 110.00 |
| 35 mm. Argus Model C2, F3.5 Argus | 29.50 |
| 35 mm. Argus A3, F4 Anast., Argus | 17.50 |
| 35 mm. Argus Color Camera, F4 Anast. | 26.50 |
| 35 mm. Argus C3, F3.5 Anast., Argus | 34.50 |
| 35 mm. Perfex 33, F3.5 Anast. | 27.50 |
| 35 mm. Perfex 55, F3.5 Scienar | 29.50 |
| 35 mm. Perfex 55, F2.8 Scienar | 39.50 |
| 35 mm. Perfex 55, F3.5 Wollensak | 45.00 |
| 35 mm. Wirgin, F2.9 Trioplan, Compur | 37.50 |
| 35 mm. Kodak Retina I, F3.5 Ektar, Compur R | 49.50 |
| 35 mm. Wellini (Latest Model), F2 Xenon, Compur R | 110.00 |
| 3x4 cm. Foth Derby, F3.5 Foth | 14.00 |
| 3x4 cm. Ihagee Parvola, F3.5 Tessar, Compur | 39.50 |
| 3x4 cm. Acro R.F., F3.5 Acro | 14.50 |
| 3x4 cm. Detrola Model K, F3.5 | 12.50 |
| 3x4 cm. Plaubel Makinette, F2.7 Anticomar, Compur | 45.50 |
| V.P. Ihagee Parvola, F3.5 Tessar, Compur | 49.50 |
| V.P. Kodak, F6.3 Anast., Diomatic | 7.50 |
| 2¼x3¼ 620 Kodak Special, F4.5 Sp. Anast., Compur R. | 37.50 |
| 2¼x3¼ Ihagee Ultrix, F4.5 Anast., Compur | 29.50 |
| 2¼x3¼ Certix, F4.5 Anast., Compur | 29.50 |
| 2½x4¼ 616 Kodak Monitor, F4.5 Kodomatic | 32.00 |
| 2½x4¼ 1A Certo, F4.5 Radionar, Ibsor | 16.50 |
| 1 5/8x1 5/8 Pilot Folding Reflex, F3.5 Tessar, Compur | 59.50 |
| 2¼x2¼ Argoflex, F4.5 Anast., Varex | 36.00 |
| 2¼x2¼ Old Model Rolleiflex, F4.5 Tessar, Compur | 49.50 |
| 2¼x2¼ Rolleiflex (Standard), F3.5 Tessar, Compur | 110.00 |
| 2¼x2¼ Korelle Reflex II, F2.9 Radionar | 115.00 |
| 2¼x2¼ Korelle Reflex II, F2.8 Tessar | 129.50 |
| V.P. Ihagee Exakta B, F2 Biotar | $145.00 |
| 2¼x2¼ Korelle I, F3.5, case | 59.50 |
| 2¼x2¼ Ciroflex, F3.5 Wollensak, case | 34.50 |
| 2¼x2¼ National Graflex Ser. I, F3.5 B&H | 49.50 |
| 3¼x4¼ Bentzin Folding Reflex, F4.5 Tessar | 69.50 |
| 3¼x4¼ Ser. B R.B. Graflex, F4.5 K.A. | 59.50 |
| 3¼x4¼ Ser. B Graflex, F4.5 K.A. | 47.50 |
| 3¼x4¼ Zeiss Miroflex, F4.5 Tessar | 69.50 |

FILM PACK & PLATE CAMERAS

| | |
|---|---|
| 2¼x3¼ Kawee, F4.5 Radionar, Compur | $49.50 |
| 2¼x3¼ Recomar, F4.5 K.A., Compur | 49.50 |
| 2¼x3¼ Speed Graphic, K.R.F. Abbey Flash, F3.5 Tessar Compur | 145.00 |
| 2¼x3¼ Speed Graphic, F4.5 Tessar, Compound | 120.00 |
| 9x12 cm. Ideal B, K.R.F. Abbey Flash, Zeiss Protar, Compur | 150.00 |
| 9x12 cm. Ideal B, F4.5 Tessar, Compur | 82.50 |
| 9x12 cm. Voightlander Avus, F4.5 Skopar, Compur | 44.50 |
| 9x12 cm. Welta, F4.5 Unofocal, Compur | 42.50 |
| 9x12 cm. Bee Bee, F4.5 Radionar, Compur | 47.50 |
| 9x12 cm. Welta, F3.5 Cassar, Compur | 57.50 |
| 4x5 Century, F6.8 Dagor, Compound | 54.50 |
| 4x5 Speed Graphic, F4.5 Xenar, Compur | 147.50 |

Send All Orders & Correspondence to 142 Fulton St. Store

10 DAY MONEY BACK GUARANTEE

ABE COHEN'S EXCHANGE 142 FULTON ST., NEW YORK, N. Y. 336 MADISON AVE., NEW YORK, N.Y.

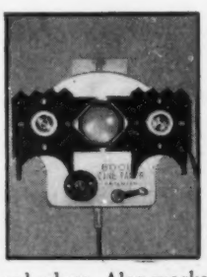
GEARMASTER

The sensational tripod head for all cameras, still and movie, full-size or miniature. Operates entirely through precision gears . . . eliminates the use of the awkward, get-in-your-way handle...makes complete pans easily.

*$17.50, incl. Excise Tax*

AMERICAN BOLEX WINDERS

For 8mm and 16mm film. Features "Tension Control" which holds the film in place regardless of the speed of winding. No need to sprag feed by hand . . . film cannot get away from you . . . sure-grip handles. Self-lubricating bearings. $6.00 ea., $12.00 pr.



BOOL CINE' FADER

Makes 64 interesting fades and dissolves. With the special extension tube, fades can be made with soft or hard edges. Also works effectively as a fader over the lens of a projector. Provision for holding filters $18.75, with extension tube and cable release.

PUT ONE DIME OUT OF EVERY DOLLAR IN WAR BONDS

*At Your Dealer's, Or Order Direct!*

AMERICAN BOLEX COMPANY, INC.
155 East 44th Street, New York, N. Y.

*Western Representative: Frank A. Emmet Co., 2707 W. Pico Street, Los Angeles, Calif.*

AN ADDRESS OF
DISTINCTION
in Chicago

on the famous
GOLD COAST

The Drake offers every convenience to the visitor in Chicago. Close to shopping centers, theatres, movies, smart night clubs, ball parks. Fast transportation to all parts of Chicago and suburbs. Away from the noise and congestion of the Loop, yet, only 5 minutes from Downtown.

A. S. KIRKEBY, *Managing Director*

The Drake
Lake Shore Drive at Michigan Avenue
CHICAGO

## More Film Speed

(*Continued from page* 34)

a method is available in the currently popular mercury vapor treatment.

The use of mercury vapor has gripped the popular imagination and has been widely adopted because of its extreme simplicity of use. The only apparatus required is a non-metallic container which can be sealed tightly, such as a glass-topped canning jar. This can be painted with two or three coats of black paint or placed in a light-tight box or drawer during the treatment periods. Film to be hypersensitized is removed from any metal reel or holder and placed in the jar along with a quantity of liquid mercury about the size of a pea. The film and mercury should not come in direct contact. This treatment may last from about 4 to 48 hours at room temperature.

The hypersensitization produced depends upon the fact that an appreciable amount of mercury exists as a vapor within the container. This vapor, coming in contact with the silver halide of the emulsion, probably produces a deposition of metallic mercury resulting in a physical intensification of the sensitivity specks of the emulsion or of the latent image centers. As with other methods of hypersensitizing, excessive mercury vapor treatment will produce high fog.

While the mercury vapor treatment is appealing in its apparent simplicity, the success of the process depends upon careful attention to details. The optimum conditions for speed increase without excessive fog are about as critical as for any other photographic process. The emulsion should be approximately equally accessible to the mercury vapor over the entire surface, so that roll films should be wound loosely.

A convenient form of mercury for use is the so-called "gray powder" or mercury with chalk. This is prepared by grinding a suspension of mercury in honey with precipitated chalk. It contains 38 per cent mercury and can be purchased at almost any drugstore for about 50 cents an ounce. The mercury with chalk can be mixed to a stiff paste with water and placed in a small jar chosen so that the mixture will about half fill it upon drying. This gives a porous hypersensitizing cake which is easier to handle and presents less danger of spillage than liquid mercury.

In using the mercury vapor method, it is necessary to determine the proper hypersensitizing time for the conditions of temperature, humidity, etc., which are employed. This can be done by developing a series of films identically exposed and subjected to increasing hypersensitizing periods with mercury vapor. Treatment times of 0, 4, 8, 16, 32, and 64 hours will usually give a sufficient range of hypersensitizing effect. From such a series the hypersensitizing time which gives the best increase in speed with acceptable fog can readily be chosen by a visual comparison.

The presence of free mercury in the darkroom where unexposed film is stored and processed presents a considerable element of danger. It would be desirable to carry on mercury hypersensitizing experiments in some place sufficiently remote from the darkroom proper to avoid any possibility of contamination.

### Hypersensitizing by After-Exposure

In a badly underexposed picture much of the negative may show no photographic detail even though some light reached the film from the deepest shadows. If a little extra light in the form of a uniform flash is allowed to act on the film before development, some of the areas which previously had too little exposure will now have enough and will show some picture detail. In other words, a given point in the emulsion must receive a certain definite exposure before a developable latent image is produced, and a contribution to this exposure can be made by exposing the entire emulsion to light after the camera exposure. In this way the effective sensitivity of the emulsion is increased, resulting in a gain in film speed.

It might be supposed that any kind of light to which the film is sensitive would be satisfactory for the purpose so long as the correct quantity was employed. However, it has been found that a low intensity-long duration exposure—that is, a dim light acting on the film for a long time—gives more increase in film speed than a short-high intensity exposure that imparts the same amount of light energy to the film. The reason for this superiority of low intensity illumination is that while the dim light is as efficient as an equal amount of bright light in causing continued growth or intensification of the existing latent image, it causes much less fog in the previously unexposed areas. Thus the dim light exposure gives a marked increase in photographic detail and density with relatively little increase in fog density.

The method of hypersensitizing by light fogging after the camera exposure might be called "safelight hypersensitizing," since the most convenient means of applying the post-fogging exposure is a safelight installed in the darkroom ceiling. For panchromatic films such as Eastman Panatomic-X, Plus-X, and Super-XX, a Wratten Series 3 green safelight is recommended, equipped with a 10-watt bulb and operated at an approximate distance of 6 feet from the film spread out on the darkroom bench. It will usually be necessary to place two or more thicknesses of paper or other material over the filter to cut down the illumination so that the proper fog density is obtained in the time chosen. The fogging time should not be less than 15 minutes and preferably as close to 1 hour as convenience will permit. The light should be regulated to give about three times the normal fog in this time.

Hypersensitizing by flashing the film uniformly to light before the camera exposure also gives some increase in film speed, but it lacks the advantageous

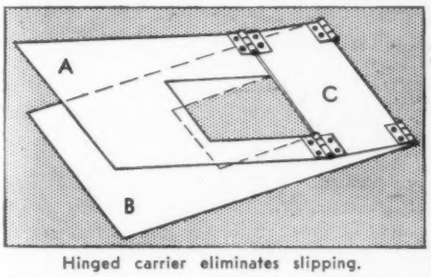
property inherent in low intensity post-exposure of intensifying the latent image while acting relatively feebly on the unexposed areas of the picture. Moreover, it has the obvious added shortcoming that it increases the amount of handling of the emulsion before the camera exposure with the attendant danger of scratches, dust and dirt accumulation, etc.

The accompanying pictures demonstrate the relative improvement in shadow detail resulting from pre-fogging and low intensity post-fogging over similar processing without hypersensitizing. Identical exposures were made on Eastman Super-XX film and developed together in D-76 for 17 minutes at 68° F. Hypersensitizing was carried out for 45 minutes at a distance of 8 feet from a Wratten Series 3 green safelight. Examination of the pictures shows that post-fogging resulted in considerably greater increase in shadow detail than did pre-fogging.

While the experimentally-minded may wish to try hypersensitizing with chemical solutions or mercury vapor, he is cautioned again to beware of its hazards. For the average photographer, safelight hypersensitizing offers a simpler and much safer expedient for getting a little extra out of the photographic emulsion in sensitivity and satisfaction.—

## Glassless Negative Carrier

HERE is a convenient glassless negative carrier for miniature films. You can make it yourself, easily, if you have access to a soldering iron and tools for cutting light metal. It makes it easy to center the negative, without the slipping




Hinged carrier eliminates slipping.

that sometimes occurs when using the ordinary sandwich-type carrier of metal or glass.

Construction details are easily seen in the accompanying diagram. The cut-out aperture should be just the size of the actual picture area of your film. After the negative is placed over the opening in the lower plate (B) the back portion of the top plate (C) is lowered into position over the margin of the negative. A little pressure with the fingers holds the negative in place while the remainder of the top plate (A) is folded down. Then the carrier can be put into the enlarger with assurance that the negative will remain in place.

Ordinary sheet metal is suitable for this use. The two plates are hinged together at the back, and the joint in the top plate is also hinged. The hinges can be fastened to the plates either by soldering or with rivets. When you use this carrier, you need never worry about having a negative slip out of place.—*Albert L. Johnson, Monterey Park, Calif.*


HABER & FINK
New York's Leading Photographic Store
for NEW or USED Cameras and Sound Equipment

| | | | |
|---|---|---|---|
| Retine II, Xenon F.2.8 lens, Like New | $105.00 | 12" Schneider Tele Xenar F.5.5 lens, Compur Shutter | $135.00 |
| Kodak 35, Rangefinder Model, F.3.5 lens, Brand New | 50.50 | 9 cm Angulon F.6.8 lens, Compur Shutter. | 95.00 |
| Makina II, Anticomar F.2.9 lens, Like New | 225.00 | 10 cm Zeiss Dagor F.9 lens, Compur Shutter | 95.00 |
| Makina II, Anticomar F.2.9 lens, Like New | 157.50 | 12" Heliar F.4.5 lens, Barrel | 145.00 |
| Exakta B, Biotar F.2 lens, Chrome, Like New | 224.00 | Eastman 8 mm Magazine, F.1.9 lens, Brand New | 101.50 |
| Contaflex, Carl Zeiss Tessar F.2.8 lens, Exc. Condition | 175.00 | 8 mm Revere F.2.5, Like New | 39.50 |
| Rolleicord, F.3.8 Triotar, Like New | 84.50 | 16 mm Bolex, Cooke F.1.5, Like New | 230.00 |
| Contameter, Close Working Attachment for Contax III or Super Ikonta B | 72.00 | 16 mm Magazine, Kodak F.1.9 lens, Like New | 89.50 |
| Revere 85 De Luxe Projector, Like New | 65.00 | Tenax II, Sonnar F.2, Like New | 135.00 |
| Leitz Gnome Slide Projector, Brand New | 44.50 | Tenax II, Tessar F.2.8, Like New | 114.50 |
| 15 mm Eastman Kodak Wide Angle Lens, Fixed Focus, C Thread, Like New | 39.50 | 4x5 Graphic View, all metal, Like New | 89.50 |
| Cine Special, Kodak F.1.9, Brand New | 445.50 | Leitz Valoy, 35 mm, Good Condition | 34.50 |
| 4 x 5 Speed Graphic, Zeiss Tessar F.4.5, Press Compur Shutter, Brand New | 160.00 | Zeiss Magniphot, 35 mm, Good Condition | 27.50 |
| Ampro YSA Sound Projector, 2" F.1.6 lens, Brand New | 375.00 | Omega B, 2¼ x 2¼, Like New | 49.50 |
| Zeiss Super Ikonta B, Tessar F.2.8, Brand New | 176.00 | Super Omega C, 3¼ x 4¼, Like New | 109.50 |
| 2¼ x 3¼ Linhof Standard, Tessar F.4.5, Graflex Back, Meyer Rangefinder, Like New | 169.50 | De Jur Versatile II, 2¼ x 3¼, New | 42.50 |
| Robot I, Zeiss Tessar F.3.5 lens, Like New | 69.50 | Federal 347, 3½" F.6.3 lens, Like New | 34.50 |
| | | Federal 250, 3½" F.4.5 lens, Like New | 39.50 |
| | | Solar No. 4, 3¼ x 4¼, 5" F.6.3 Wollensak lens, Like New | 59.50 |
| | | Eclipse 730-B, 3¼ x 4¼ Double Condenser, Like New | 29.50 |
| | | Laborant, 9 x 12 cm, 5¼" F.4.5 Benar lens, Good Condition | 79.50 |
| | | Elwood 5 x 7 Studio, Good Condition | 24.50 |

WE PAY THE HIGHEST PRICES FOR SECOND-HAND CAMERAS, PROJECTORS, LENSES, BINOCULARS AND PHOTOGRAPHIC OPTICAL EQUIPMENT.

HABER & FINK, INC.
12-14 WARREN ST. N.Y. PHONE BA 7-1230

FEDERAL
for that "Professional Touch" to your ENLARGEMENTS

6 POPULAR MODELS
for negatives from 35mm. up to 2¼ x 3¼". Complete with lenses.
21.50 to 55.90
Prices $1.00 higher on West Coast.

ASK YOUR DEALER

Compare!
Check them—part for part—and you'll find in Federal Enlargers, every feature that is essential to give you the same perfect performance as the most expensive machines.
Complete Catalogue on request

AMERICA'S FASTEST SELLING ENLARGERS

FEDERAL
MANUFACTURING & ENGINEERING CORP.
203 Steuben Street Brooklyn, N. Y.

AREMAC CAMERA INC.

***Hard To Get?***... Believe it or not, we have it!
NEW or USED . . . *Never a shortage at AREMAC!*

For immediate delivery all Wide-angle Normal and Telelenses for the Leica and Contax; a full line of Stereo Cameras, Copy and View Cameras; Goerz-Zeiss-Schneider Lenses all focal lengths. All model Speed Graphics—8—16mm. Cameras and Projectors. Macro and Micro Cameras and Accessories.

| Used | | New |
|---|---|---|
| $ 22.50 | Weston Master No. 715 Exposure Meter | $ 25.50 |
| 195.00 | Automatic Rolleiflex f:3.5 C.Z.T. Compur Rapid | 235.00 |
| 165.00 | Contax II f:2 Sonnar | 210.00 |
| 200.00 | Kodak Ektra f:3.5 Ektar | 304.00 |
| 125.00 | Plaubel Makina II f:2.9 Anticomar | 185.00 |
| 150.00 | Super Ikonta B f:2.8 C.Z.T. Compur Rapid | 176.00 |
| 65.00 | 6.5x9 cm. Recomar No. 18 f:4.5 Compur, coupled R. F. | 95.00 |
| 87.50 | Bantam Special f:2 Ektar | 116.75 |
| 150.00 | Ann. Speed Graphic 4x5 or 3¼x4¼ f:3.5 Schneider Xenar | 185.00 |
| 155.00 | Leica G Summar f:2 | 190.00 |
| 198.00 | Contax III Sonnar f:1.5 | 295.00 |

★

No "bargain list" issued, because what you want is always a bargain at Aremac!

Write us your needs today; trades accepted.

Used equipment guaranteed optically perfect. Many of these items can scarcely be told from unused equipment.

AREMAC CAMERA Inc.
1 EAST 43rd St. NEW YORK, N.Y.
DEPT. O

**35MM HIT OF 1942!**

36 exp. rolls fine grain dev. Vapor. and enl. to 3¼x4½ glossy (except Univex). Free mailers & samples. Rush films today (include postage with remittance) to

**85¢**
18 exp. 55c

**STUDIO 35** Box 677, Grand Central P. O., NEW YORK CITY

**POSTAL "AUTOMATIC"* SMASHES TELEGRAPH SPEED RECORDS**

***NOW READY***

Only POSTAL TELEGRAPH HAS IT! So next time you have messages that *must* get through . . . messages that call for *extra* speed and *extra* accuracy (at *no* extra cost) . . .

**CALL Postal Telegraph**

For your convenience, charges for telegrams telephoned-in appear on your telephone bill.

**For descriptive folder — address Postal Telegraph, 157 Chambers St., New York or ask local branch manager.*

**HOME PORTRAITURE *Simplified* BY A NOTED HOLLYWOOD EXPERT!**

You don't have to have a colossal studio with plush carpets, indirect lighting and all the fancy trimmings of a "pro shop" in order to take good portraits! Your subject's own living room is a perfect setting! Next month, in a brilliantly illustrated article, the noted Hollywood photographer, L. Willinger, gives amazingly simple directions for perfect results when the sitting is made right in the model's home. For complete instructions on home portraits that don't require complicated lighting effects and tricky backgrounds, read this grand article in

POPULAR Photography NOVEMBER ISSUE
ON SALE AT ALL NEWSSTANDS OCT. 9th


## Fellowships

(*Continued from page 23*)

record photographs of contemporary American subjects, are typical.

Evans, who was forty years old at the time of his grant, was educated at Williams College and at the Sorbonne in Paris. His record of accomplishment prior to the grant included a one-man show at the Museum of Modern Art in New York, exhibits in the Annual Exhibitions of Contemporary American Photography in Philadelphia, the Exhibition of Photographs for Art and Industry in New York, the Brooklyn Museum, the College Art Association Exhibition, and the Pennsylvania Museum of Art. His work is represented in permanent collections at Smith College, Wadsworth Athenaeum, Fogg Museum of Modern Art, and the Metropolitan Museum of Art. He has illustrated three books: "The Bridge," by Hart Crane; "The Crime of Cuba," by Carleton Beals, and "African Negro Art." A book of his photographs was published under the title, "American Photographs." Evans was granted a renewal of his fellowship for another year in 1941, to carry on his project which is not yet completed.

Any photographer who feels comparably qualified is free to apply to the Foundation for fellowship assistance. Grants are open to men and women, married or single. The stipend is less for single persons than for those who are married, since grants are made on the basis of living requirements over the period during which the proposed work is to be done. The exact amount is determined according to individual circumstances. The applicant must be in a position to devote his entire time to the work for which the grant is to be made. Professors and teachers who have received sabbatical leave on full or partial salary are also eligible, and in special cases the trustees will grant fellowships for terms shorter than one year.

Applicants must ordinarily be citizens of the United States, although in exceptional cases permanent residents who are not citizens will be eligible. There are no restrictions with respect to race, color, creed, or political philosophy. Applicants, according to the Foundation, should normally be between the ages of 25 and 40 years, although the Committee of Selection is empowered, in exceptional cases only, to nominate a limited number of persons older than forty.

There are no strings whatsoever attached to these fellowships. Unlike patrons of the arts in other days, the Foundation in no way influences or exacts obeisance from its fellows, who are given complete freedom to work as they wish. Fellows are required merely to make a report of their accomplishments at the end of the year's tenure. These reports are published every two years. The fellowship is as free and untrammeled a grant as could be imagined. The money is paid in installments to suit the needs and convenience of the fellow, himself.

Edward Weston, Walker Evans, and

Dorothea Lange were already well known to the photographic and art worlds before they became Guggenheim fellows. Miss Lange, the distinguished California photographer, received her fellowship for making a series of documentary photographs of the American social scene, particularly in rural communities. She has done extensive work as official photographer for the Resettlement Administration, the California State Emergency Relief Administration, the Farm Security Administration, and the Bureau of Agricultural Economics. Her prints have been widely exhibited both here and abroad, and have appeared in many magazines. Although her fellowship was granted in 1941, special work for the government in connection with the war effort has forced her to interrupt her documentary project for the duration.

The appointment in 1941 of Dr. Eliot Furness Porter and, this year, of Wright Morris, shows that a degree of fame is not a prerequisite to consideration by the committee. Neither of them is well known in the photographic world. Dr. Porter, for instance, who lives in Hubbard Woods, Ill., is a biologist with an M.D. degree. He did research work at Harvard, where he taught bio-chemistry, and in 1938 he turned to photography. His interest in birds led naturally to the camera, and his fellowship was granted to make a photographic record in black-and-white and color of birds in the United States.

Wright Morris, who was born in Nebraska in 1910 and now lives in Brooklyn, N. Y., is a young writer who is currently enjoying his first literary success with a best-selling novel, "Your Uncle Dudley." He has also achieved a measure of recognition for his photographs, which have been exhibited at the Museum of Modern Art and the New School of Social Research in New York. His photographic work has shown a marked preoccupation with houses, and he was granted a fellowship to complete the manuscript and photographs for a book to be called "The Inhabitants," in which pictures of houses are to be accompanied by imaginative descriptions of the people living in them. The advisory committee of photographic experts whose opinions were solicited called Morris' photographs of houses "the most beautiful they had ever seen."

To apply for a fellowship it is necessary merely to fill in the application form, which will be mailed on request to Henry Allen Moe, secretary general, John Simon Guggenheim Memorial Foundation, 551 Fifth Avenue, New York, N. Y. The application asks complete details concerning educational background and previous accomplishment, and a full outline of the proposed work for which the grant is sought.

The application, together with samples of the photographer's work, the number of such samples entirely left to the discretion of the applicant, is mailed to the Foundation on or before October 15 of any year.

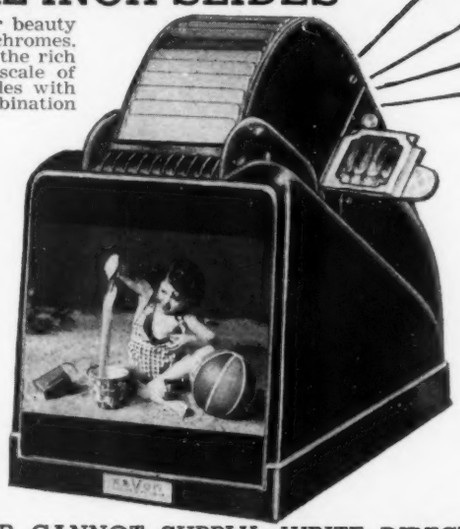
The Committee of Selection makes its final nominations the following February or March. This committee is composed of five persons of high academic standing drawn from the Foundation's Advisory Board. The committee this year consisted of Dr. Frank Aydelotte, director, Institute for Advanced Study; Dr. Wallace Notestein, professor of English history, Yale University; Dr. Linus Pauling, professor of chemistry and chairman of the Division of Chemistry and Chemical Engineering, California Institute of Technology; Dr. Florence R. Sabin, member emeritus of the Rockefeller Institute for Medical Research, and Dr. Edwin Bidwell Wilson, professor of vital statistics, Harvard University School of Public Health. The committee consults with responsible scholars, artists, and photographers regarding the value and practicality of the projects submitted, as well as the personality and promise of the applicants. The identity of the experts consulted is secret for obvious reasons.

If the academic awesomeness of the Committee of Selection has not frightened you, and you are a serious worker with a record of accomplishment and with well-defined objectives, the John Simon Guggenheim Memorial Foundation will consider your application for a fellowship. If granted, it will leave you free for a full year to pursue your chosen work. From forty to sixty grants will be made next spring, and deserving photographers have as good a chance as able workers in other fields.—►


*Glamorize your Color Slides with this famous Novex Projector!*

**FOR ALL 2x2 INCH SLIDES**

Bring out the full color beauty of your cherished Kodachromes. Enjoy in full measure all the rich detail and the full tone scale of your black and white slides with this famous Novex Combination Viewer and Projector. Switch from the 7x7 in. built in viewer to life size projection instantly.



**7x7 IN. VIEWING SCREEN**

The big 7x7 inch built in viewing screen shows a brilliant image ample in size for personal and small audience showings and bright enough for daylight viewing. The famous Novex condenser type reflex optical system brings out the full beauty of your black and white slides—and all the rich color values of your Kodachromes.

**BRILLIANT LIFE-LIKE PROJECTION**

Give your cherished slides the benefit of this new type of projection. Enjoy the convenience of a built in viewing screen for personal viewing without the need of extras or change in set up. Switch from viewing screen to life size projection on wall or screen instantly. You will be amazed at the brilliance of your pictures, the rich detail and the full tone scale. Novex combination projectors are ideal for amateur use—they are widely used in industry—in educational and class room work—and by Dentists for viewing X-rays. See Novex at your Dealer—or write today for detailed literature.

*Ready to Operate* **$44.50** Case Extra $3.75

**NOVEX DIV. OF UTILITY SUP. CO.**

IF YOUR DEALER CANNOT SUPPLY, WRITE DIRECT 307 W. MONROE ST. • CHICAGO, ILL.

*BRINGS OUT THE HIDDEN BEAUTY OF YOUR SLIDES*

2 NEW COLOR THRILLS
WITH YOUR COLOR TRANSPARENCIES!

1. LITE-NING
ESPECIALLY CREATED REDUCER FOR COLOR TRANSPARENCY CORRECTION AND *IMPROVEMENT!*

2. IVORINE
FASCINATING PROCESS TO TURN COLOR TRANSPARENCIES INTO *COLOR PRINTS IN 3 MINUTES.*

YOU CAN DO IT YOURSELF
EASILY, EFFICIENTLY, ECONOMICALLY

No complicated manipulations . . . no expensive equipment . . . no, not even a darkroom needed —just your color transparency, "LITE-NING" and "IVORINE". Photography's newest thrill can be yours. Be convinced—see for yourself.

COLOR PRINTS ONLY 1c EACH

$3.95 THE SET

That's all it costs to have an IVORINE color print of your favorite color transparency. Go to your dealer or write for information. Both products available in separate units. Each $2.00.

COLOR-FULL LABORATORIES
408 Guarantee Trust Bldg., Atlantic City, N. J.

MULTI-LENS PHOTO ENLARGER

ENLARGES, COPIES and REDUCES all negatives from 35mm. to 4x5 inches AUTOMATICALLY. Includes two very fine ENLARGING LENSES of different focal lengths. Calibrated easel, steel construction, filter, etc.

$11.85

Money back GUARANTEE. Send for FREE CIRCULAR.

GRAPHOMAY 148 West 23rd St. NEW YORK

8-16MM BULK MOVIE FILM Spool your own film and save $$$! Fine grain high quality pictures. Weston 12. 100' S/8m $1.95; 100' sel. 8m $1.15; 100' 16m $1.35. Camera spools (any camera) 40c ea. Processing rate: 100 ft. 16m—85c; 25' S/8m 50c.

SAVE MONEY— DEVELOP YOUR ← OWN MOVIES only $15.50 complete

Everything needed to develop your own film. Outfit pays for itself in short order. Reel holds 110 ft. 16mm or 8/8mm film. Drying rack, formulae, full instructions included. Fully guaranteed. F. O. B. Chicago.

*Smaller outfit, for 34 ft. 8/8m. film, F.O.B. Chicago..... $10.50
½-gal. set Reversal Chemicals, $1.35—1 gal. (for large outfit) $2.10
Write for Free Circulars!

SUPERIOR BULK FILM CO.
188 W. Randolph St. Dept. B-10 Chicago, Ill.

20 READY MADE 2x2 SLIDES $1

Special Offer—unusual scenic, travel and pictorial views—full double 35mm size, sharp and clear—mounted, ready to show in any standard projector. 20 for $1. 40 for $2. All different. 10 Art Slides, $1; 20, $2; 30, $3. List of other subjects sent with each order.

ART SLIDE CO., Sippo Lake P-10, Canton, O.

## Stains—and How to Prevent Them

(*Continued from page 35*)

water just as soon as any sign of reduction of the negative image is observed.

After development, films or prints should be rinsed either in water or an acid stop bath, such as a 1 per cent solution of acetic acid. In hot weather the rinsing is not possible; the film would soften or melt. The addition of 5 per cent sodium sulfate (anhydrous) to the acetic acid will prevent swelling of the gelatin, or the use of a 3 per cent solution of chrome alum with or without the addition of the sodium sulfate will adequately harden the film so as to withstand fixing and washing at higher temperatures.

The importance of this rinsing procedure before fixing cannot be overemphasized, since it will prevent a host of possible stains in the fixing bath. For example, if the film is not rinsed and is not agitated when first placed in the fixing bath, the developer carried over will reduce to metallic silver some of the silver salts dissolved by the hypo, and a brownish stain of dichroic silver similar to that described above will be produced.

Also, when using an alum hardening fixing bath, the developer carried over by the film is apt to react with the alum forming a white sludge in the bath and a white scum or stain on the film. This is not removed in the wash water, and is difficult to wipe off before drying. Adequate rinsing in water removes the developer from the film, and the use of an acid stop bath kills the alkali in the developer and renders it inactive and therefore prevents staining in the fixing bath. The white scum can be removed by bathing the well-hardened film for a few minutes in a 5 per cent solution of sodium carbonate and then washing thoroughly.

The fixing and washing operations are vital ones for insuring the absence of stains, especially those that show up after negatives and prints have been stored for several years. To avoid stains, the finished films or prints must be free from both soluble silver salts and hypo. The purpose of fixing is to dissolve away the undeveloped emulsion, so that it can be removed by the wash water. You cannot fix films thoroughly in an exhausted fixing bath. It is important, therefore, not to attempt to fix too many negatives or prints (not more than seventy-five 8x10-inch films per gallon), and it is infinitely better to use two successive fixing baths in which case the second bath is always relatively fresh and is used to replace the first bath when it is discarded.

If all the silver salts are not removed by fixing and washing, then on storage of the films or prints the hydrogen sulfide present in the atmosphere would react with the silver salts, forming a silvery looking stain of silver sulfide. Slight sulfide stains can be removed with the cyanide solution described earlier, but severe ones cannot be eliminated without taking away some of the image also.

One of the most frequent causes of stains is insufficient washing of films and prints. This eventually results in a chemical reaction between the silver image and the residual hypo, with the formation of yellowish silver sulfide. This causes the faded appearance of old, improperly washed prints. Only a trace of hypo is necessary to "fade" the highlight portions of a print, but it is not always easy to eliminate the hypo completely. With films it is relatively easy—simply use two successive fixing baths and wash for 30 to 45 minutes in a stream of running water.

In the case of prints, the paper fibers and the baryta coating tend to retain the hypo. With most papers the use of two fixing baths and washing for one hour will yield prints which will not fade in from 10 to 20 years in climates other than tropical ones. In the tropics, however, where high temperatures and humidity hasten the reaction between the residual hypo and the silver image, it is necessary to get rid of the hypo by the use of an eliminator such as a mixture of 4 ounces of hydrogen peroxide (3 per cent) with 3¼ ounces of ammonia (3 per cent) in 1 quart of water. After washing, bathe for about 5 minutes at 70° F. and then wash for 5 to 10 minutes before drying. This treatment oxidizes the hypo to harmless sodium sulfate.

Local yellowish or brownish stains may be a result of local retention of silver or hypo, caused by films or prints sticking together in the hypo or wash water. Manipulating the films or prints to insure that they do not stick together will prevent these local stains.

In some localities the water supply is supersaturated with air, so that on immersion in the wash water the films or prints become covered with air bubbles which cling tenaciously and prevent thorough access of the water. This results eventually in brown stains where the presence of the air bubbles prevented the washing out of the silver and hypo. The remedy is to remove the air bubbles

"Here's my new self-propelled gadget bag."

by passing a squeegee over the prints or films while immersed in the water.

Yellowish images caused by the presence of hypo can usually be restored by bleaching the image of silver sulfide to silver chloride and then redeveloping this to black metallic silver as follows: First harden the film by bathing for 2 or 3 minutes in a solution containing 2½ drams of formaldehyde (40 per cent) with 70 grains of sodium carbonate in one quart of water. Then wash for 5 minutes and bleach in the following:

**Kodak S-6 Stain Remover**

| | Avoir. | Metric |
|---|---|---|
| **Stock Solution A** | | |
| Potassium Permanganate | 75 grains | 5.3 grams |
| Water to make | 32 ounces | 1.0 liter |
| **Stock Solution B** | | |
| Sodium Chloride | 2½ ounces | 75.0 grams |
| Sulfuric Acid, C. P. | ½ fluid oz. | 16.0 cc. |
| Water to make | 32 ounces | 1.0 liter |

Use equal parts of A and B.

The bleaching should be complete in from 3 to 4 minutes, and there usually is left a brownish stain of manganese oxide all over the film, which should be removed by rinsing in water and then placing in a 1 per cent solution of sodium bisulfite. Then wash for 3 or 4 minutes, expose to a strong light (sunlight or arc light) until the white image turns purple, and redevelop in a non-staining developer such as Kodak D-72 (1:2).

Since most faded prints contain some yellow silver sulfide in the highlights, this is likewise changed to metallic silver by the above procedure so that the highlights of the restored print are apt to be slightly fogged. Faded Solio prints (gold toned) cannot be restored in this manner because the bleaching bath dissolves the gold image.

Stains due to dyes, indelible pencils, or red and black writing inks can be removed by bleaching with Kodak S-6 and redeveloping.

When chemical removal is not practical, it is possible to eliminate stains by making a copy of the negative or print, using a suitable film and a filter of the same color as the stain. Inspect the print or negative through your filters, choosing one that makes the stain disappear.

Elimination of stains, once they are present, is far more bother than avoiding them in the first place. Observe the precautions noted here in developing, fixing, and washing your negatives and prints, and you will have few or no stain troubles.—

## Covers for Trays

OCCASIONALLY the darkroom worker wants to turn on the room light or open the door for a moment while a print is developing or fixing in a tray. You can do this without fear of fogging the print if you have a tray-cover handy, and one can be made easily from the bottom or top section of an empty enlarging-paper box. Keep one of these covers handy to fit trays of various sizes, and next time you have to rush out to answer the phone before a print is fixed sufficiently, simply cover the tray. You can improve these covers by equipping them with drawer-knob handles.—

**PHOTOMURALS**

**FROM YOUR OWN FAVORITE NEGATIVES WELL WITHIN YOUR REACH!**

Just picture in your mind's eye that favorite shot of yours . . . the one which everyone admired . . . and you yourself had to admit was good. Picture that as a Photomural . . . enlarged to a size that brings forth all of the regal majesty which is the power and charm of a Photomural.

Perhaps you have a negative of the children . . . that spot in the mountains . . . your favorite lake at sundown . . . whatever it is, we at K. & F. have "America's best equipped photographic plant" and have delivered most of the outstanding Photomurals for architectural and commercial circles.

Here you would expect that negative of yours to really produce a fine photomural . . . and at a price you could easily afford . . . you're right . . . that's just what will happen!

**FREE** A limited edition entitled "From Blank Walls to Pictorial Epics." Beautiful collection of some of the world's finest photomurals. Write Today.

**KAUFMANN & FABRY COMPANY**
425 S. WABASH AVE., CHICAGO, ILL.

DATA. Soho Reflex camera Modified Basic lighting with one-fifth second exposure at f.8. Agfa par-speed Ortho film developed in regular Glycin formula for two and one-half hours. Defender Velour Black I printing paper using Mortensen system of projection control. Print completed by Mortensen Abrasion-Tone process.

**CONTINUING**

the Basic and Special Courses that for 15 years have made William Mortensen famous as a teacher of photography

*Personalized Instruction*

BROCHURE ON REQUEST

**MORTENSEN SCHOOL OF PHOTOGRAPHY**
LAGUNA BEACH CALIFORNIA

**YOU'LL BE DELIGHTED $1**
**35mm. FILM DEVELOPED 36 ENLARGEMENTS**

**8 Exp. Roll Enlarged 35c**
**16 Exp. Split Enlarged 55c**

Prove it to yourself—send your next roll to us. Fine grain developing, "electric-eye" precision. Modern Beauty prints 3¼ x 4¼, deckled, with embossed margin and date. If less than 25 prints FREE print credit. Send money and roll or write for Free Mailers.

**25¢** Professional contact finishing. 8-Exposure roll developed and complete set of Super Professional prints. Print credit for poor exposures.

**U. S. PHOTO SERVICE**
Box 5710-A Dept. A Chicago

**SPEED-EZ-EL**
*Simplifies your* **ENLARGING**

A sturdy, all-metal easel—faster and easier to use. Fits standard papers without adjustment. Compactness and light weight permit complete flexibility—enable you to get many unusual effects and compositions from the same negative. Special finish assures wire-sharp focusing without glare.

**PRICED RIGHT**

| | | | |
|---|---|---|---|
| 4 | x5 $.90 | 8x10 | $1.75 |
| 3½x5 | .90 | 5x 7 | 1.25 |

**"FRAMETTES"**
***beautify your* ENLARGEMENTS**

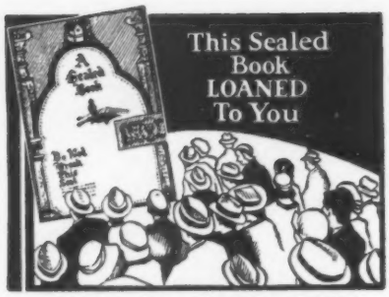
**. . . you can do it yourself in 5 minutes**

Modern, distinctive, and inexpensive. Fully adjustable—Frametes accommodate all sizes up to 20 x 26. Available in Bright or Satin Chrome, complete with wire and full instructions—only 50c per set.

**SPEED-EZ-ELS—FRAMETTES**—at your dealer—or sent direct postpaid if cash with order.

**A. J. GANZ CO.** **DEPT. P-6**
**112 N. Haywerth** **Hollywood**

**DISTRIBUTORS**- Arel, Eastern, Hornstein, Levit, Raygram and Wholesale Photo.




THOUSANDS EVERYWHERE ACCLAIM THIS

New Psychology Of Life!

Have you unrealized hopes? Are the better things of life always just beyond your reach?

Times have changed—but have you? Adopt a new psychology of life and MASTER YOUR PROBLEMS. It takes no greater mental effort to achieve results when you know how.

Let the Rosicrucians show you how, by the use of simple laws, you can apply the powers of your mind to bring about startling changes in your life. If you are sincere in your desire, write for the free Sealed Book. It will point out how you may obtain this most helpful information. Address: Scribe E.L.R.

The Rosicrucians
AMORC
SAN JOSE, CALIFORNIA, U. S. A.
Perpetuating the Ancient Rosicrucian Secret Teachings

IF YOU WANT THE BEST
A TRIAL WILL CONVINCE YOU

35mm. Film Developed $1 36 Enlargements

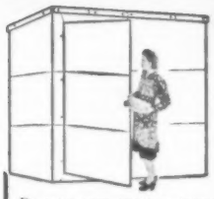
18 exp. 75c Single or Double Frame
36 exp. Reloads 50c Ultra Speed Pan.

We finish all other miniature and split size film in our famous 3¼ x 4¼ Beauty Prints — Deckled, Embossed Margin and Embossed Date. 8 exp. No. 828 and 127, 35c. 12 exp. splits, 45c. 16 exp. splits, 55c. Send roll and money or write for free mailers and complete price list. You will agree that our Modern methods and long experience DO make a BIG difference.

Artistic Contact Finishing, 8 exp. rolls, complete set of deckled-edge embossed, wide-margin prints. Credits for failures. FREE Enlargement coupon with each roll. 25¢

MAIL-BAG FILM SERVICE
Dept. 9, Box 5440A, Chicago, Ill.

Enjoy your own DARKROOM
$14.85



- Ready-made
- Portable
- Easy to assemble
- Big and roomy
- Light-tight
- Sturdily built

Do your own work at home. Use your own darkroom. Size 6½ ft. high, 3½ ft. wide, 7 ft. long. Heavy duty box board reinforced construction, mahogany color. Easy to assemble with wing-nut bolts, no tools required. Complete in one package, ready to assemble, shipped prepaid (U.S.A.) . . . $14.85. Write for complete illustrated folder, address Dept. P10.

MODERN PRODUCTS CO. 1134 Nebraska Ave. TOLEDO, OHIO

The RAY SCHOOLS

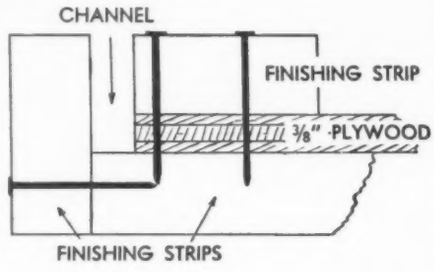
PROFESSIONAL COURSES to meet Commercial demands. Subjects covered: Illustrative, Portrait, Fashion, Architectural, Exterior, Interior, Industrial, Catalog, Color, News, Retouching, Tinting, Copying, Airbrush. Studies include camera operation, lighting, composition, enlarging, printing and other essentials. Personal training • expert instruction • individual advancement. Finest equipment. Day, Half Day or Evening Classes. Write Box 710, 116 S. Michigan Blvd., CHICAGO, ILL.


## Model Darkroom Has Everything

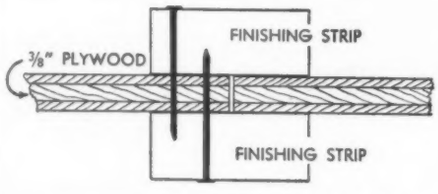
(*Continued from page 25*)

accompanying diagram. Use this same construction on wall corners.

The outside edges of the ceiling are fitted with channels in the same manner,




but the supporting strips are not necessary. A simple joint will serve to seal the two panels together down the center, sandwiching the edge of one panel between two finishing strips to make a channel as shown in the diagram. Side panels are joined in the same way.




Next, decide on the height of the walls —6'4" or 6'6" should be sufficient, but be sure provision is made for enough space between the top of the walls and the cellar ceiling to permit setting up the darkroom and taking it down. The ceiling panels are installed by sliding them over the top edge of the walls. A two-inch clearance is the minimum.

When all panels have been sawed to the proper height, reduce the width of one panel on each side by ¾". This is necessary to make up for the overlapping of the front and rear panels on the side panels—front and rear panels extend clear to the edges of the floor assembly, while sides must be cut off to fit between. Now you are ready to make center and corner channels, following the same plan used on floor and ceiling.

Saw the front wall panel lengthwise, using half for the wall and the other half for the door. To strengthen the door and make it light-tight, cut a section ⅜" larger than the door out of the 4'x8'x¼" panel. Center the door panel on this larger section, and glue and nail together, using ⅞" finishing nails driven through and clinched. This provides not only needed strength and rigidity, but also a two-step door edge that fits corresponding framing of panel, ceiling, and floor edges to insure against the passage of light and dust—particularly if the edges are felt stripped.

Now the darkroom is ready for assembly, but first it is a good idea to decide on the height of work tables and install strips on the wall panels at the proper height to support rear and side edges. Use ⅞" finishing nails, driven through and clinched—and use plenty of them.

The table for printing and enlarging should be kept low to accommodate maximum enlarger extension. A height of about 22" will allow clearance for your knees when using an ordinary 15" stool. If additional space is required to accommodate the full extension of the enlarger, an opening can be cut in the ceiling and covered with a square box made of ¼" plywood.

Be sure to get your other tables up high enough. For the average person, about 40" will be right to avoid stooping. Some fitting will be necessary after assembly, of course. Let's put the darkroom together.

First, the floor is leveled and in place. Then the rear panels are set up, followed by the side panels and finally the front. Next, the ceiling is slipped into place. The whole assembly is tied together with hooks and eyes, screwed in tightly. Bend the shank of the hook if necessary to keep tension enough for a snug fit.

The door is best installed with four hinges to keep it in alignment, instead of two large ones. With it in place, you are ready for plumbing, lighting, and ventilation.

First comes the sink, and I would suggest one of enameled steel, 20"x30". It is light and inexpensive, and its flat flange will permit easy countersinking in the surface of the table. It is about the thickness of one layer of the plywood, and can be set into it by cutting through this layer. If linoleum is used for the table covering, it can be extended over the flange to the inside edge of the sink. Next come the fixtures.

A mixing faucet should be installed about 15" above the bottom of the sink. If you feel like splurging, put in two. You will find plenty of use for them. Use soft ½" copper tubing, and sweated connections. If you don't want to tackle this part of the job, you can get your plumber

"He just sold his first picture to Pop Photo!"

to do it for you. Hook up the drain with a reducer threaded for an ordinary garden hose coupling, and lead it off to the basement floor drain.

Your electrical wiring need not be complex, but it must be safe. Use standard wiring throughout—not extension cord materials. Mount outlets for safelight, enlarger, and printer, overhead light, and fan. If you want to add an extra touch that will repay you well, install a two-pole main switch on the outside, near the door, with a "tell-tale" red bulb. This will save a lot of worrying, for if the bulb is out you will know that the current is off and that no accessories inside can be left turned on.

Forced ventilation is necessary, and a single-unit blower will do the job very nicely. Don't mount it on the wall itself, or vibration may be transmitted to the enlarging table. Instead, mount the blower on a board fastened at the upper end to a cellar beam or rafter, and with the lower end resting on the floor. Install the blower about 2″ from the wall, and use a series of sponge rubber rings cut from an old kneeling pad, or a heavy canvas sleeve to bridge the gap without transmitting vibration.

The tight joints make this darkroom very nearly dustproof, but that won't help any if your ventilator blows in a steady stream of dust-laden air. Make an air cleaner to filter the air that comes in. You can build a good one by taking a pair of wire screen strainers and nesting them together, with a half-inch layer of oil-soaked steel wool in between. Soak the steel wool in mineral oil and allow it to drain for a day or two, and then mount the filter over the air intake. It can be given a semi-annual cleaning by rinsing in gasoline and soaking in oil again.

While you are about it, it is easy to provide temperature control at the time you put in your blower. Make a long air intake box about 6″ square, extending from the floor to the ceiling. Fasten it to the intake side of the blower, so that the air comes in through it. Cut one opening in the bottom, and another in the top. Then mount a damper in the box in such a manner that it will permit you to get air from either end.

When your darkroom temperature is low, turn the damper to take in air from the top of the box and you will get warm air from near the ceiling. When it is high, turn it the other way and the blower will force in cool air from near the floor.

Of course an air outlet also is necessary. For this purpose, you can drill a series of holes in one of the walls and install a light baffle on the outside. To make use of the current of exhaust air, mount your print-drying shelf on the wall just below the holes. This will speed up drying.

For the finishing touches, shellac the darkroom inside and out, and then enamel the inside. One of the acid- and alkali-resisting paints will be most practical for the lower area, up to at least a foot over the developing and finishing tables and the sink. Tables can be enameled, but I have found linoleum best, cemented down with edges protected by finishing strips. Wax it well, applying several coats and rubbing each in well.

What is the cost? You can consider it as an investment, rather than an outright expense, for you can use this darkroom almost anywhere. Here it is, in approximate figures:

| | |
|---|---|
| Lumber | $40.00 |
| Plumbing | 15.00 |
| Electrical | 10.00 |
| Linoleum | 10.00 |
| Paint | 5.00 |
| Ventilator | 9.50 |
| Nails, felt, etc | 2.00 |
| Total | $91.50 |

Of course there are ways you can cut corners, particularly if you don't need a portable setup. The cost can be cut in half by putting the darkroom in a corner, building only two walls, and using the original ceiling and floor. Inexpensive wallboard can be employed in a permanent darkroom, with wooden bracing. The size can be varied to suit your needs.

But if you want a darkroom that you can take anywhere, make it portable and build it along these lines. It is a workroom that offers apologies to no one.—

## Developing Sheetfilm in Rollfilm Tank

WHEN you have just one or two sheetfilms to develop, it's frequently inconvenient to use the regular tank you employ when putting through a dozen at a time. The arrangement shown in the accompanying photo has solved the problem for me, and enables me to develop 4x5 films in a Nikor rollfilm tank. The same idea can be applied to most rollfilm tanks.

Photo shows sheath.

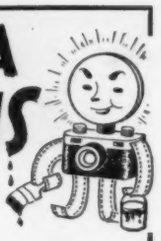
The basis of the arrangement is a set of three sheaths for holding the films. These sheaths are made of stainless steel, and while this material is somewhat hard to obtain now, you very likely can pick up some scraps which will fill the bill. Any other thin metal can be used, providing it is coated with a paint such as Probus or Kodacoat.

Each sheath is made the same size as the film, with an extra quarter-inch left at each end. This extra metal at the ends is bent over to form flanges which hold the film in place. Don't bend these flanges over too far—they serve to hold the sheaths apart the proper distance when in the tank, thus assuring a good circulation of solution. The sheaths themselves are curved to a semi-circular shape, the amount of curve being such that the flanged ends must be squeezed together slightly to get them into your tank. The film is flexed and loaded into a sheath emulsion side out. The resilience of the metal sheaths holds them in position in the tank and keeps them from shaking around or rotating. A much smaller amount of developer is required in using this setup than would be needed for most large sheetfilm tanks.

*—Harry Radzinsky, Great Neck, N. Y.*


CAMERA BARGAINS

STILL AVAILABLE!



NEW

| | |
|---|---|
| Super Ikonta B, f2.8 Tessar, latest | $176.00 |
| Ikonta A Special, f3.5 Tessar, Comp.-Rap. | 78.00 |
| Tenax I, chrome, f3.5 | 60.00 |
| Super Dollina chrome f2.8 Xenar | 89.50 |
| Super Dollina chrome f2 Xenon | 99.50 |
| Kawee 9x12, f4.5 C. Z. Tessar, D. A. Comp. | 85.00 |
| Victor "4" 16 mm., latest Aircraft model | 101.50 |
| Bolex H-16, 4" f4 focus. Cooke | 265.00 |
| Ciné-Kodak Mag. 16 mm., $120.00; 8 mm. | 101.50 |
| Ciné-Kodak 16 mm. "K", $81.50; "E" | 42.00 |
| Keystone proj. 16 mm. A-82 | 84.50 |
| Keystone proj. 8 mm., A8, $84.50; R-8 | 56.25 |
| Robot II, f2.8 C. Z. Tessar | 115.00 |
| Argus C-3, photoflash | 45.05 |
| National Graflex II, f3.5 B & L Tessar | 87.97 |
| Zeiss Taxo 9x12, f6.3 | 19.50 |
| Argus Projector, PA | 22.75 |
| Foth Derby, f3.5 | 22.50 |
| Ektra f1.9 Ektar, Comb. Case | 388.50 |
| Kodascope 16-10 Proj., 750 W. | 90.00 |

AS-NEW

| | |
|---|---|
| Auto Rolleiflex, latest | $192.50 |
| Leica G chrome f2 Summar, case | 155.00 |
| Graflex B 3¼x4¼, f4.5 front-surface mirror | 75.00 |
| Graphic 3¼x4¼, Kal. r.-f., f3.5 C. Z. Tessar, Comp. | 175.00 |
| Graphic 4x5, Kal. r.-f., f4.5 C. Z. Tessar, D. A. Comp. | 150.00 |
| Mentor Reflex 2¼x3¼, f3.5 C. Z. Tessar, ring-set Comp., light wt., case | 95.00 |
| Dollina III chrome, f2.8 C. Z. Tessar | 75.00 |
| Leitz 8x42 binocs., cent.-adj., case | 125.00 |
| Baldina f2.9, Compur-Rapid | 49.50 |
| Recomar "33", f4.5, D. A. Comp. | 59.50 |
| Contax II Chrome, f2 Sonnar, E. R. Case | 179.50 |
| Super Ikonta B, f2.8 Tessar, latest, E. R. Case | 155.00 |
| Exakta B, f2.8 Tessar, Case | 110.00 |

Hundreds More • Liberal Trade-Ins • 10-Day Trial

WRITE TODAY!

Now is the time to get that new camera *because: we are allowing the highest trade-in values ever on your old equipment!*

CASH FOR YOUR CAMERA

Turn your extra equipment into cash . . . We buy cameras, etc., outright at top figures. For quick action write or ship to Dept. C.

geo. levine & sons

15 CORNHILL Est. 1896 BOSTON, MASS.

"Over A Quarter Century On Cornhill"

35 M.M. FILM DEVELOPED and ENLARGED 3½ x 5

$1

Any 35 mm roll developed in ultra fine grain formula, vaporated and enlarged to 3½x5 by "magic-eye" control. 36 exp....$1.00. Inc. reload..$1.35
18 exp....75. Inc. reload..1.00
36 exp. reload for Univex Mercury.50c
Speedy service. All work guaranteed. Postpaid if money accompanies order. Free mailing bags.

NORTHSUL

437 Pennsylvania Ave. Brooklyn, N. Y.

**Before • AFTER**

TWO prints from the same negative — before and after treating with VICTOR, the *simple, one-solution, fine-grain* INTENSIFIER. Peps up flat negatives. Saves underdeveloped and underexposed films. A darkroom necessity. Complete instructions with every tube or bottle. Tells how to use VICTOR Intensifier for "developing in daylight," too. 4-oz. tube, **25c**. 8-oz. tube, **45c**, 16-oz. bottle, **85c**.

*at all camera stores*

**James H. Smith & Sons Corp.**
**1028 Colfax St. • Griffith, Ind.**

GUARANTEED! . . . To keep film tough and pliable—and less susceptible to finger-prints or scratches!

**EMBY INFRA-RED**

*For perfect, fine-grain drying in less than 10 min.*

The EMBY No. 104 "Bulls Eye" Infra Beam Drying Lamp with CARBON FILAMENT gives concentrated penetration of Infra Red rays — has built-in pure silvered reflector which never needs polishing! Operates on standard 110-120 Volts . . . $4.00 per pair. (Same, but clear glass, $2.20 per pair.)

EMBY PRODUCTS CO., 1802 W. Pico, Los Angeles

**35 MM FILM FINE GRAIN developed AND enlarged**

Any 36 exposure roll of film fine grain processed and each good negative enlarged to approximately 3" x 4" on single weight glossy paper for only **1.00**

8 EXPOSURE ROLLS developed and enlarged to twice original negative size for only **25c**

Rush your films today. Ask for FREE Booklet when you order.

**MINILABS** Dept. 2J2

BOX 485 ENGLEWOOD, N. J.

*(Please Note New Address)*

**Photography for PLEASURE or PROFIT**

Prepare for profitable business or fascinating hobby, at home under guidance of qualified instructors. No previous experience necessary, common school education sufficient. Many earn while learning. Our practical studio methods also qualify for well-paying positions upon graduation. Send coupon below at once for free booklet, "Opportunities in Modern Photography," particulars and requirements.

AMERICAN SCHOOL OF PHOTOGRAPHY Dept. 2367 Chicago, Ill.
1315 Michigan Avenue
Send booklet, "Opportunities in Modern Photography," full particulars and requirements.

Name..... Age.....

Address.....

City..... State.....

## Making Murals

(*Continued from page 27*)

old method of laying it flat in a tray.

When inserting the paper in the developer for the first time grasp it by the corners and pull it through and under the developer. Raise it clear of the solution and put it through in this manner once or twice more. Then, with the third immersion, commence rolling up the print, loosely.

The first times in the developer will give the paper time to soak up enough of the solution to become wet all over and prevent developer streaks. From this point forward development is carried on by rolling the print on itself, backward and forward.

While the rolling process is under way there is enough of the print under the solution at all times to carry out development evenly. Gallons of developer are not necessary. An inch or two to cover the bottom of the tray will do the job.

Follow the same procedure with short-stop and hypo. You don't need a separate developing box for each solution. The job can be done with only one, by working quickly when it is time to change solutions, and can be handled easily with two.

Working with a pair of home-made trays, fill one with developer and the other with short-stop, before you start. Develop the print, and shift it to the short-stop at the proper time. Roll it there until development has been halted, and you can leave it for a minute while you pour out the developer and fill that tray with hypo for fixing.

It is possible to rinse your prints in this same manner, changing water several times, but this job can be done more easily by using a large sink or a bathtub. Roll the print back and forth in the running water if there is not room for it to lie flat.

In mounting the prints, use any weight of cardboard which suits your fancy. You can employ mounting tissue, or use the old-fashioned way of doing it by means of paste in dry form. This is mixed with water. Apply the mix paste to the mounting board just before pressing down the wet print and the backing paper.

Backing paper is nothing more than a fairly heavy wrapping paper. This is soaked in the wash water with the prints and is pasted, while wet, to the back of the mounting board. It prevents curling of the print and the board. As it dries, the paper on the back of the mounting board will exert enough pressure to counteract the curling force caused by the drying of the print.

Once the backing paper has been put in place, the board is turned over and the print is put on the board while wet. Each of the papers is squeegeed to the mounting board. This will force out the water to prevent bubbles and to smooth out the paste. Dry in ordinary room temperature.

When it has dried, the mount can be trimmed by covering the edges with binding tape, which also will hold them flat.

If tray size has kept you from making big prints, now is the time to bring out your favorite negatives. Make up a few miniature murals for the walls of your home.—

## Desensitization

(*Continued from page 33*)

workers to experiment with various dyes in the hope of finding the answer. Of the many which were tried, only three have survived in popular favor and practical usefulness. These are Phenosafranine (employed in several commercial desensitizers now available), Pinakryptol Green, and Pinakryptol Yellow.

Phenosafranine desensitizers, in addition to their primary purpose of reducing emulsion sensitivity, also prevent or at least retard chemical fog in development. A disadvantage lies in the red staining action, which varies in strength with different emulsions. This is not a true red; it freely transmits the blue and violet rays to which printing paper is sensitive. The stain is partially removed in the fixing bath and during the washing period. That which remains can be removed in two or three successive baths of denatured alcohol, the latter diluted with one-fifth its volume of water. Removal of the stain is also facilitated by soaking the film in a solution made by dissolving 200 grains of alum in 20 ounces of water, followed by a thorough washing.

Pinakryptol Green, like Phenosafranine, can be added to some developers to permit simultaneous desensitization and development. It has only a little tendency to stain. However, it causes a slight loss of image density and may introduce some chemical fog. It works effectively when mixed in with the developer, in the proportion of one part desensitizer stock solution to 30 parts of developer.

Pinakryptol Yellow has no staining action on any material, and causes little or no chemical fog. It does permit a slight loss of image density, and can be used only as a preliminary bath since the desensitizing action is partially destroyed by sodium sulfite. This, however, is the recommended method of desensitizing. Both Pinakryptol Green and Yellow will keep for quite a long time if stored in brown bottles and kept in the dark.

The desensitizer as sold is diluted with an indicated quantity of water, in which form it becomes the working solution that can be used over and over again until exhausted. Pinakryptol Green and Yellow, for example, are sold in small bottles containing one gram of the dye. The entire contents are dissolved in a quart of warm water, and the solution brought down to a working temperature approximately that of the developer. After use, it is poured back into the brown bottle and stored in a dark place for future use. A 50-50 water-alcohol mixture improves the keeping qualities of the Pinakryptol desensitizers.

Although treatment in a desensitizer is

said to reduce to something like 1/1500 the film's original sensitivity, it has no destructive effect on the latent image, and no allowance has to be made for exposure in the camera. Increase in developing time is sometimes necessary due to the effect of the desensitizer upon the developer, and other factors.

The safety of darkroom illumination is a relative matter. Aside from suiting the safelight to ortho or pan emulsions, we must not forget that relative safety depends on the intensity of the light, the duration of exposure to the light, and the distance from negative to lamp. Keeping these factors in mind, we know that the light should not shine directly on the bath. Place the tray of developer about three feet away from the lamp. After a short period of development, uncover the tray and observe the growth of density. A little later you can hold the film up to the lamp to study progress by transmitted light. This can be done several times, re-covering the tray after each inspection, until you feel the negative is ready for the fixing bath. Transference from developer to fixer in full light does no harm.

Development by inspection naturally presupposes ability on the part of the worker to read progress in a developing negative, and to recognize that point in the process when development should be stopped and the negative transferred to the hypo. Since there are no scientific rules to guide the beginner, this ability must necessarily be acquired by experience. A method that works for one man operating under a given set of conditions will not necessarily prove equally successful for another. Preliminary trials must therefore be resorted to by each worker before he attempts the method with valuable exposures.

The primary essential is to standardize conditions as to illumination strength (which includes the size of the safelight glass), distance from and position with respect to the lamp, type and make of film, and the nature of the developer, as well as the distance from the lamp at which the negative is to be inspected, and the duration of the inspection period plus the frequency of inspection.

The tendency of the beginner in this method is to stop development too soon. The dark appearance of the image as viewed by transmitted light aids this deception, the worker neglecting to make allowance for the fact that translucency of the image is impeded by the presence of unexposed silver that will not be reduced but must await clearing in the hypo bath. A more or less rough-and-ready guide is to wait until the blacks (highlights) have become so dark as to be opaque. This guiding appearance will vary with different emulsions, another reason for standardizing conditions and making tests with a specific film until that film's appearance under inspection has been thoroughly learned so that results can be repeated.

Tank development by the time-and-temperature method is undoubtedly a more scientific means of processing films —and deservedly the most popular, as it is the most convenient method we have. Desensitization, on the other hand, sometimes influences the developing process and character of the negative. The effect on the developing time caused by desensitization is less serious, since this can be compensated for by adjustment of the developing period.

On the whole, most workers look upon inspection development, with or without desensitization, largely as an emergency measure necessary under certain conditions. It is generally understood that, regardless of exposure, there is a certain limit of development which must be reached to effect satisfactory contrast. Time-and-temperature tables for a given film and developer give us these limits in precise, laboratory-tested terms. If a film is underexposed, longer development will only produce contrast to a degree sometimes beyond the range of the softest available papers; if overexposed, shorter than indicated development time will result in more or less flatness.

Let's not overlook the fact that a particularly difficult situation will not always lend itself to routine treatment. Only by observation of the film in the developer can we tell when it should be pulled out. And who cannot point to his experience in trying to save an overexposed negative by cutting short his development—within reasonable limits, of course? Haphazard, unscientific—call it what you will; inspection development, aided and made relatively safe by observing ordinary precautions, is definitely an aid to trouble-shooting in photography.

Use a tank, as you have been doing, or the tray method. Be ruled by time and temperature. For the majority of your work, this is the best routine. But for that special job, when you're not quite sure or when you know the old reliable is certain to let you down, try inspection. But desensitize first!—

## Illuminated Tray for Working on Negatives

UNLESS you're a veteran, you're apt to find that intensification or reduction of negatives will go too far without your realizing it until too late. As viewed during one of these processes in an ordinary tray, the degree of action which has taken place may not be apparent to the eye. This can result in too much reduction or intensification, as the case may be.

Glass tray placed above light-box.

You can control results much better when the negative is viewed by transmitted light as the chemical action takes place. A good way of arranging this is to use a glass tray (a refrigerator dish will do nicely) which is placed over a light-box. A simple yet effective setup of this kind is shown in the accompanying drawing. You won't need a strong light for this purpose, and anything stronger than about 25 watts is apt to overheat the solution.—


**OLDEN**
CAMERA & LENS CO.
1265 BROADWAY · NEW YORK · N·Y·

**35MM**

| | |
|---|---|
| Argus C II, coupled Rangef. F 3.5 | $ 23.00 |
| Argus C III, F 3.5 Rfdr and flash | 26.95 |
| Contax II Sonnar F 2, $154.00; III F 1.5 | 199.00 |
| Dollina II F 2.9, $48.00; III Xenar 2.8 | 59.50 |
| Leica F Elmar 3.5, $105.00; Mod. G F 2 | 145.00 |
| Leica G F 1.5, $196.00; IIIB Summitar L.N. | 259.00 |
| ALL Telephoto and Wide Angle Lenses for Leica and Contax Available: | |
| Perfex 55 F 2.8 and E.R. Case | 46.00 |
| Perfex 55 Wollensak 3.5, brand new | 34.50 |
| Retina II F 2.8, $84.50; Xenon F 2 | 95.00 |
| Robot I Tess. 2.8, $68.00; Robot II Tessar 2.8 | 105.00 |
| Tenax II Sonnar F 2, $128.00; Tessar 2.8 | 108.00 |
| Univex Mercury F 3.5, $14.50; E. R. case | 2.75 |

**OLDEN SPECIALS**

| | |
|---|---|
| Summer 1942 inventory listing on request. | |
| Agfa Speedex F 4.5, latest | $24.80 |
| Argus Color Slide Projector, latest | 18.50 |
| De Jur Critic Exp. meter, $12.50; G E meter, $17.50; Haynes Enlarging meter K2, $4.95; De Jur 5-A | 10.85 |
| Duo Six-20 F 3.5, $45.50; Retina I F 3.5 | 37.00 |
| Elwood 5x7 enlarger N-2 | 36.80 |
| Federal Enlarger, 331, $26.75; 219 | 17.90 |
| Solar Mod. II F 4.5 Wollensak | 42.00 |
| Omega A, $34.00; Omega B | 44.00 |
| Leitz Vassex II 2¼x3¼ Varob lens | 95.00 |
| Foth Derby II F 2.5 Rfdr. | 32.50 |
| Foth Derby F 3.5, $18.75; F 2.5 | 22.50 |
| 4 x 5 or 3¼ x 4¼ Anniv. Speed Graphic, latest model Ektar 4.7, complete | 114.20 |
| 2¼x3¼ Miniature Speed Graphic F 4.5 | 88.00 |
| Many other Speed Graphics from $58.00 up. | |
| 2¼x3¼ or 4x5 B&J Press F 4.5 cpr. | 64.50 |
| 6x9 film pack camera F 4.5 cpr. DA comp. | 44.00 |
| Super Ikonta B Tess. 2.8, $138.00; Super Ikonta BX, latest | 178.00 |
| SVE Proj. Model RK, $23.50; Model DK | 31.00 |
| Spencer Delineascope Slide-Proj. | 22.90 |
| Kine Exakta Biotar F 2, $275; Tessar 2.8 | 183.00 |
| Xenar 3.5 | 168.00 |
| For Kine Exakta | |
| Tele Megor 5.5 18cm., $98.00; 5.5 15cm., $89.00; 5.5 25cm. | 165.00 |
| Trioplan 4.5 12cm. | 80.00 |
| Reproduction stand | 33.00 |
| Instruction booklets for any camera | .25 |

**REFLEX**

| | |
|---|---|
| Argoflex F 4.5, latest and ER Case | $ 34.50 |
| Praktiflex Xenar 2.8, $96.00; Xenar 3.5 | 88.00 |
| Ikoflex I F 3.5, $64.00; Ikoflex III Tessar 2.8 | 198.00 |
| Korelle II Tessar 2.8 | 129.00 |
| Exakta B Tessar 2.8, $98.00; Biotar F 2 | 148.00 |
| Pilot Super F 3.5, $34.00; F 2.9 | 42.50 |
| Rolleicord I, $74.25; Rolleicord II F 3.5 | 89.50 |
| Voigtlander Superb Heliar 3.5 | 92.00 |
| Rolleiflex Automatic, latest, like new | 192.00 |

**MOVIE**

8MM

| | |
|---|---|
| Cine Kodak F 3.5, Mod. 20 L.N. | $ 25.20 |
| Keystone K-8 F 3.5, $19.80; F 2.5 | 24.95 |
| Keystone K-8 C-8, $27.50; C-8 | 19.75 |
| Keystone R-8 500 watt, latest | 48.50 |
| Magazine Cine Perfex Turret F 2.5 | 51.00 |
| Revere 88 F 3.5, $22.90; F 2.5 | 33.50 |
| Revere model 80, $48.75; Model 85 | 54.50 |

16MM

| | |
|---|---|
| Cine Kodak Magazine F 1.9 | 86.00 |
| Cine Kodak Model K F 1.9 | 57.00 |
| Keystone A-7 F 2.7 | 29.50 |
| Keystone Projector A-75, 500 watt | 75.50 |
| B&H 70DA F 1.5 Cooke, latest | 205.00 |
| Bolex 16mm F 1.9 Meyer | 198.00 |

**BRAND NEW—Still in Stock**

Kodascope Projectors

| | |
|---|---|
| Model 70, $61.50; 70A, $72.50; 33 | $ 48.80 |
| Sixteen-10 | 80.00 |
| Keystone A-8, 750 watt | 84.50 |
| Kodak Model K | 81.50 |
| Cine Kodak Magazine Mod. 90 | 101.50 |
| Keystone K-8 F 1.9 | 64.50 |
| B&H Companion F 3.5 | 52.80 |
| General El. Exp. Meter | 22.25 |
| Graflex Super D 3¼x4¼ | 161.00 |
| Linhof Technika 5x7 Tess., 4.5 8¼" | 410.00 |
| Ampro KD projector, $164.00; Victar 16mm. projector | 135.00 |
| Bell and Howell Autoload Master F 2.7 | 185.00 |
| Bolex 8 and 16mm. movie camera | 171.50 |
| Kodaslide I, $19.75; Kodaslide II | 35.35 |
| Bolex 8 and 16 projector, like new | 169.00 |
| F-R 2¼x3¼ Reporter camera F 4.5 lens. | 74.50 |
| Vocar slide projector, demonstrator, latest. | 9.95 |
| Speed Graphic Tessar 4.5, Anniversary | 154.00 |

**Trade-Ins Accepted.**

All these cameras are used, but in perfect working order. If interested send your money order and the camera will be shipped by return mail on our ten day trial basis with money back guarantee

**1265 BROADWAY at 32nd Street**

**This New Springback Doubles the Value of Your CM Camera**

Send your Camera, or if you can reset scale send single holder that fits O.K

$10.95 POST PAID

Double film holders made to interchange with Graphic and other standard double holders. Today's best buy: $2.75 each; 6 for $13.26, postpaid. Prices include 10% Federal Tax. Order Now.

Lets you use double cut film holders or filmpack adapters, as in regular "newer" cameras, and eliminates the separate focusing panel nuisance. Springback is attached just like original single holders, and double film holder slides under hooded, spring attached focusing panel. Made in two sizes: 2¼x3¼ for 6½x9 cm. cameras and 3¼x4¼ for 9x12 cm. cameras. All metal, except ground glass and cloth hood flaps.

**FITTED TO YOUR CAMERA**

and focusing scale reset to register with all standard american double holders and film pack adapters. Spring back is ¼" thick; 2¼x3¼ weighs—15 oz.; 3¼x4¼—19 oz. Standard fitting is for 6½x9 cm. cameras using single holders 3" wide and 9x12 cm. cameras using single holders 5 15/16" wide, with 1/32" edges, which slide in camera. Can be fitted to other cm. camera for $2.50 extra. Send camera with order. Camera returned Postpaid. Perfect fit guaranteed

LEONARD WESTPHALEN, Dept. B-1042, 506 N. State St., CHICAGO

**Three Unusual Values in SLIDE FILES**

"Master"

To meet the requirements of all both in quality and price • Manufactured of beautiful quarter-sawed sycamore throughout • Glossy natural finish • Brass plated hardware •

"MASTER": For 650 readymounts or 250 slides; movable Separators and Index Tabs for filing by subjects; Handle; removable Index. . $3.45

"MIDGET": Will fit in a coat pocket, yet will hold 175 readymounts; movable partitions..... 1.25

"DE LUXE": Slotted for 100 slides or 200 readymounts; Handle; removable Index..... 3.95

Mail orders filled; P.P. prepaid. Files for negatives in eight sizes including 35mm.

*Write for Catalogue*

THE NEGA-FILE COMPANY
EASTON, PENNA.

*Free* BARGAIN BOOK

**FIRST STEP To Successful Pictures**

Free illustrated catalog, crammed with hundreds of bargains. Lists everything photographic—still and movie cameras, films, lenses, equipment—at tremendous savings. Liberal trade-in allowances. Satisfaction guaranteed or your money back. 10-day trial. Write for your FREE Copy—just out. Hurry!

**CENTRAL CAMERA CO.** Since 1899
Dept. J-17, 230 S. Wabash Ave., Chicago, Ill.

**35 mm FILM Fine Grain DEVELOPED AND ENLARGED**

36 ENLARGEMENTS (3¼" x 4½") matte or glossy. Money back guarantee. Write for complete price list describing our different services at equally low prices. Mailing bags free. $1

**MODERN PHOTO LABS**
71 West 45th St. New York, N. Y.
Dept. D

**35 MM SPECIAL!** PLUS X 100Ft. $3.25

25 Ft. . . . $1.00 100 Ft. . . . $3.50

EASTMAN SUPER XX PANATOMIC X PLUS X
AGFA ULTRA-SPEED SUPREME FINOPAN
DUPONT SUPERIOR TYPE 1-2-3

**RELOADED CARTRIDGES All Types—3 for $1.00**

Bulk Winder, $2. Mail orders promptly filled—P. P. or C. O. D. Camera quotations offered. Highest prices for used cameras.

MODEL FILM CO., 620 Trinity Ave., Bronx, N. Y.

GRADUATE TO A *Seemann* 3-star SPLICER!

★ Exclusive "tension pins" for greater accuracy!
★ Dry emulsion scraper — ideal for Kodachrome!
★ Anchored cement - cannot upset!

AT ALL DEALERS!

WHOLESALE PHOTO SUPPLY COMPANY
7266 BEVERLY BOULEVARD ★ HOLLYWOOD, CALIFORNIA

## Seeing the War—in Tabletops

(*Continued from page 21*)

Geddes' staff lay down the battle on an artificial sea.

To the editors of *Life* the reaction of readers was "both vociferous and gratifying." Although every effort was made to avoid deception in the captions accompanying the pictures, people glancing at them for the first time expressed amazement over *Life's* ability to get such photographs on the field of action.

Obviously this was no puny tabletop. A huge set was built on a low platform measuring approximately 18 by 20 feet. The platform itself was transformed into a waterless sea on which the battleship models were maneuvered in accordance with the known facts. In its design, Geddes made good use of his long experience with theatrical productions and the making of models. It was he, it will be recalled, who designed the Futurama for General Motors, a hit of the New York World's Fair in which cities, farms, and highways of the future were depicted in a vast panoramic series of astonishingly realistic models.

While the sea battles posed new problems, they were not altogether unfamiliar to Geddes, who for years had been preoccupied with naval and miltary tactics. In 1918 he invented a war game, based on tactical science, which swept the country in popularity. Here he also employed models, which the twenty-eight opposing players maneuvered against each other.

It was this game that led him to more serious experiments with ship models and maneuvers, and for a period of years he developed his interest by photographing, experimentally, warship models in delineation of historic battles. Thus evolved a technique that led to the remarkable representations of the Coral Sea and Midway battles of the present war.

The extent of the work, problems, and costs involved in these glorified tabletops is astonishing. The ship models themselves are made of brass by jewelry craftsmen in the Geddes workshops. Measuring five to eight inches in length, they are exactly to scale and complete in detail down to the revolving gun turrets. These details are in all cases so accurate that Navy men have been known to identify the refit dates on some of the models. They cost $200 apiece to make, and Geddes fleet at present numbers more than 2,400 ships. This collection is made up of representative models of all ship classes included in the fleets of all the world's naval powers. Should any nation commission a new type of ship, Geddes' own "shipyard" builds its facsimile. When ships are sunk he sustains a corresponding loss to his usable fleet. The six plane carriers sunk by U. S. bombers have been placed on the scrap pile. If a cruiser is converted to a carrier, the conversion job is likewise done on the model, necessitating the replacement of deck and superstructure. Three model makers are employed continuously in constructing ships, and converting old ones.

The problem of creating the effect of water took months of experimentation. The ocean is a composition consisting mostly of cement, carefully rippled to simulate the wind-created motion of the sea. The surface was painted and repainted again and again until it photographed faithfully. It was found, for instance, that the right atmosphere demanded color and variations of color. The finished surface contained green, blue, red, and white to reproduce on panchromatic film the tone variations created normally by the reflections of sunlight on constantly moving water. The surface finish is glazed, and hard enough to walk on. The final effect of the "water" was dependent upon the placement of lights in relation to the painted surface. For this no specific formula was found, each battle scene demanding its own treatment, depending upon the particular arrangement of the models in the scene and the time of day in which the battle took place. The result achieved in the pictures was due, finally, to an ideal balance of all these elements—light, color, and reflection.

Backdrops of various types of gauze, muslin, and canvas are used for sky and horizon. Here again the handling of light is important in achieving the effect of haze and distance near the horizon. Models built to much smaller scale are used for ships placed near the horizon line, to enhance the illusion of distance so successfully accomplished in the pictures.

The effects of bombs falling in the water and of smoke from the ships are achieved by additional set pieces made of composite materials that are specially treated. The splash and spray of the bombs as they strike the water, like the models, are individual pieces set on the surface. The smoke billows are also made of tangible materials set onto the ship. All of these properties are solid and firm, rather than soft and flimsy, as they appear. They are filed away and used over and over again. Here again the handling of light is the important factor in achieving a natural effect in the picture.

The most difficult problem of all, according to Geddes, was encountered in creating the ships' wakes convincingly. Months of discouraging experiment were spent on it. Painting the surface of the "water," the most obvious method, was no good at all. Wakes are foamy and brilliant, paint on the flat surface was not. Many thing were tried, and finally the solution was found in a combination of prepared materials, both soft and glistening, laid on the water to produce the realistic effect of foam and spray.

Even after this material was perfected, there remained the problem of scale. Hundreds of actual photographs of ships made from airplanes, together with data on the altitude from which the pictures were taken, were used in arriving at the correct shape and size of the foamy trail left on the water by the moving craft.

Plane models are suspended on fine

threads, and in some of the pictures an added note of realism is created by photographing the scene through off-focus props in the foreground to simulate the struts of the plane from which the photographs were supposedly made.

Light, according to Geddes, is perhaps the most important single factor in the final illusion of reality. For it is with light that atmsophere and space are created on the film. Special lighting equipment was made to supplement standard apparatus, and in the average scene about 20,000 watts of floodlight and 10,000 watts of spots are used. Many of these lights are filtered through variously colored gelatins, and their light is distributed to bring out the variations in the water's surface and to simulate the roll of the sea. The effect of the light on the models, bombs, smoke, etc., has to be watched carefully to conceal the artifice. Geddes excels in the manipulation of light, which has played an important part in most of the work he has done throughout his career.

Although light may be the most important single factor in creating an illusion, another real achievement was in getting the right focus to produce the effect of a photograph taken at infinity. When a picture of a model is taken at but five feet from the camera, it is difficult to make it look like anything else but what it is—a model five feet from the lens. The solution to this problem is the secret of the technique.

The actual exposures are made with eight 4x5 view cameras, loaded with Eastman Panatomic-X film. The cameras are placed at various but permanent vantage points around the setup, thus eliminating the necessity of moving one camera from place to place and enabling the photographer to take shots from several angles.

While the representation of the battle is as accurate as possible with the information available at the time the setup is made, artistic license must of necessity be resorted to in order to get all the ships into one frame, as naval engagements are fought over great distances. While the scale could be adjusted to a wider area, the ships would have to be made so small that they would appear as mere specks in the final photographs.

That Geddes' tabletops are no amateur's winter night pastime has already been made clear. The ship models are made to exact scale, and this entails an enormous amount of research and labor. A close watch must be kept on new developments throughout the world war theater, so that the model fleets are at all times apace with the world's battle wagons. For each ship that is sunk in a battle to be depicted, a model must be made to show the way in which she went down. If it sinks stern first, the forward half must be built on end to show the bow jutting out from the water. The work also entails extensive research in tactics and maneuvers, in order to depict battles accurately.

At this writing experimental work is in progress on land battle setups. *Life's* issue of July 20th carried a photograph of one of Geddes' terrain models, showing the desert battlefield where the allied forces came to grips with the Nazis in their drive on Alexandria. In later issues, actual battles between opposing tank formations will undoubtedly be depicted.

Don't let magnitude of Geddes' battle tabletops put your own sorties with scissors, glue, and gadgets in the category of cutting paper dolls. Tabletops are important as their use by commercial photographers established long ago. Far from discouraging activity in this direction, Geddes' achievement should spur amateurs on to perfect their own technique and, for those serious and imaginative workers, to discover new and important applications for this fascinating branch of photography.—▶

## Dogbody's Darkroom

(*Continued from page* 38)

like tubular lamps, also dials, gauges, and other gadgets.

He closed the cabinet with the imageless print inside, carefully placed a whiskbroom by its side, and turned on the current.

"Now look through the eyepieces of my latest and most important invention, the inspectoscope, and you will see a modern photograph, produced by modern methods," my friend directed.

I looked, and looked again, but could see nothing. The contraption was pitch dark inside and I told Horace so.

He took a look to make sure, fussed around with its mechanism for some time, then gave it up.

"I'm sorry," he said, "but the Inspectoscope appears to be out of order and prints made by my method can only be seen in this viewer. They are invisible to the naked eye—fluorescein dye used as a pigment, you know. Too bad you were not here last Thursday. I made two prints that day and they came out fine. One of them was so good, in fact, that you could hardly tell it from an ordinary bromide enlargement."

That gave me an exit cue, but before staggering out into the night I wanted to clear up one point that still puzzled me.

"Tell me, Horace," I asked, "what was the purpose of the whiskbroom that you so carefully placed beside the Inspectoscope?"

"Well," replied Horace, "it's like this. Sometimes when I put a print in the Inspectoscope and look through the eyepieces I actually see a picture. Then I fall on the floor and throw a fit. When I get up, I brush myself off with the whiskbroom and go on about my business. So I always keep the whiskbroom handy."

"Move over, brother," I screamed, "and hand me that whiskbroom. I'm going to show you how to throw a fit that really is one!"—▶

---

—Best results in projecting stereo pictures are obtained when the proper type of projection screen is used. A matte white surface is preferred.—▶


RABSONS REAL VALUES

*For Quick Action!*

MOVIE SPECIALS

| | |
|---|---|
| E FILMO 70 D, Brown Factory Rebuilt, f/3.5 T.H.C. Lens | $117.50 |
| G VICTOR No. 3, f/3.5 lens | 39.50 |
| E VICTOR No. 5, Black, 5 speeds, f/2.9 lens with case | 92.50 |
| D FILMO Auto Load Speedster f/2.7 lens | 120.00 |
| NEW CINE-KODAK K, f/1.9 lens, Goodspeed synchronized Range Finder | 81.50 |
| D FILMO Auto Master, Turret, f/2.7 lens | 195.00 |
| E KEYSTONE B1, f/3.5 lens | 18.75 |
| E KEYSTONE A7, f/2.7 lens | 39.50 |
| E REVERE 8mm Model 99 Turret, f/2.5 lens | 62.50 |

ENLARGERS

| | |
|---|---|
| E 2¼x3¼ LEITZ DOUBLE CONDENSER, no lens | 55.00 |
| E 2¼x3¼ DEJUR VERSATIVE, no lens | 77.50 |
| E 2¼x2¼ KODAK MINIATURE, f/4.5 lens | 32.50 |
| E 35mm LEITZ VALOY, no lens | 32.50 |
| NEW 35mm FILMARUS, f/6.3 lens | 22.50 |
| E 2¼x3¼ CARL ZEISS AUTO FOCUS, f/6.3 lens | 27.50 |

E means Excellent condition.
G means Good condition.
D new but used in Demonstration

**All merchandise guaranteed for 90 days and subject to a 10-day trial period. Subject to prior sale.**

RABSONS

111 WEST 52nd ST. NEW YORK



We All Agree

FOR YOUR VERY NEXT ROLL OF FILM TRY

KIN-O-LUX

FOUR DIFFERENT, DISTINCTIVE FILMS WILL SERVE YOUR EVERY PURPOSE! . . .

1. Outdoor — Weston 8; Scheiner 18° — $3.20—100 ft.
2. Outdoor — Weston 12; Scheiner 20° — $3.75—100 ft.
3. Indoor - Outdoor — Weston 50; Tung. 40 Scheiner 26°; Tung. 24 — $6.00—100 ft.
3. GOLD SEAL Indoor Only — Weston 100; Scheiner 29° (No Outdoor Ratings) — $6.40—100 ft.

KIN-O-LUX • 105 W. 40 ST. • NEW YORK

United Still Sends A Bargain List!

Our low prices are maintained. No inflation at "United." Trades are willingly accepted. Buy on our 10-day trial offer.

**35mm CAMERAS**

| | |
|---|---|
| Leica G f2 Summar, l.n. | $154.50 |
| Leica III b f2 Summitar, latest | 259.00 |
| Leica A f3.5 Elmar, latest | 54.50 |
| Contax II f2 Sonnar, latest | 164.95 |
| Contax III f2 Sonnar, $194.95; with f1.5 Sonnar | 225.00 |
| Robot I f2.8 C.Z. Tessar | 64.50 |
| Robot I f3.5 Meyer | 54.50 |
| Tenax II f2 Sonnar, latest | 159.00 |
| Kodak Extra f1.9, latest | 339.00 |
| Contaflex f2 Sonnar, latest | 225.00 |
| Retina I f3.5, perfect | 34.50 |
| Perfex 55 f2.8, $52.50; with f3.5 | 39.50 |

**120 SIZE ROLL FILM CAMERAS**

| | |
|---|---|
| Kodak Duo 620, f3.5 Chrome, latest | 49.50 |
| Super Ikonta A f3.5 C.Z.T., latest | 109.50 |
| Super Ikonta B f2.8 C.Z.T., R.F., latest | 149.50 |
| Rolleicord f3.5 C.Z., perfect | 89.50 |
| Watson Miniature f4.5 Tessar, l.n. | 79.50 |
| FR Reporter f4.5 C.Z. Tessar | 84.50 |
| 2¼x3¼ Speed Graphic f4.5 Ektar | 97.50 |
| 6x9 Film Pack f4.5 D.Ext., l.n. | 34.50 |
| Voigtlander f4.5 Skopar Compur | 29.50 |
| 6½x9 Agfa D, Ext. Film Pack f4.5 Compur | 39.50 |
| Agfa Speedex f4.5 lens, latest | 27.50 |

**MISCELLANEOUS CAMERAS**

| | |
|---|---|
| 3¼x4¼ Graflex Auto f4.5 B&L Tessar | 49.50 |
| 3¼x4¼ Graflex B f4.5 K.A., perfect | 54.50 |
| 3¼x4¼ Graflex Auto Box Only | 24.50 |
| 3¼x4¼ Ann. Graphic f4.5 lens, latest | 109.50 |
| 4x5 Ann. Graphic f4.5 lens, latest | 109.50 |

**SPECIAL CLEARANCE SALE ON POPULAR LENSES**

| | |
|---|---|
| 85cm f2 Contax Telephoto | $139.50 ea. |
| 135cm f4 Contax Telephoto feet | |
| 28mm f3.5 Contax Biotar W.A., latest | |
| 90mm f4 Leica Elmar | $ 94.50 |
| 90mm f2.2 Leica Thambar | 99.50 |
| 73mm f1.9 Leica Hector | 97.50 |
| 135mm f4 Leica Elmar | 119.50 |
| 5" f6.8 Goerz Dagor in mount | 34.50 |
| 180mm f4.8 Goerz Ser Ib in mount | 39.50 |
| 18cm f5.5 Tele-Xenar for Korelle | 79.00 |
| 18cm f5.5 Tele Xenar for 2¼x3¼ Graphic | 81.50 |
| Zeiss Protar W.A. lens for 5x7 | 19.50 |
| B&L Zeiss Protar W.A. lens for 8x10 | 24.50 |
| Kodak Ektra lenses in stock, all sizes. | |

Largest stock of used movie lenses in stock. Write for complete list. Used photographic catalogue on cameras, still or movie, projectors in 8-16mm., sound, on request. Expert Camera Repairing.

UNITED CAMERA EXCHANGE
78 Chambers Street, New York, N. Y.

AMERICA'S MOST GORGEOUS MODELS in Art Negatives

PERFECTLY EXPOSED AND DEVELOPED FOR YOU TO MAKE FASCINATING PROFESSIONAL QUALITY ART PHOTOS

Here's your chance to make superb salon prints of art models, stocking girls, etc. — the prints you've dreamed about — right in your own darkroom! Enjoy new photographic thrills by learning how to light, compose and print the professional type of art figure photo. Learn by doing through the use of our perfect negatives.

SAMPLE NEGATIVE SET 2¼" SIZE 6 for $1

For those desiring less than the complete sample set we offer two 35mm size, 25¢; two 2¼", 50¢.

35MM KODACHROME SLIDES for projection. Made by Sidney Dru of Hollywood. Set of Six for $2.50 — SUPER SET of 14 including STOCKING MODELS, $5.00 — single sample, 50¢.

FREE! One 35mm Black and White Art Transparency will be sent absolutely FREE with all orders for $1 or more.

BROADWAY NEGATIVE SERVICE
Box 37, Rugby Sta., Dept. P10 • Brooklyn, N. Y.

Write For YOUR Free Catalogue.
State whether you have 8mm or 16mm projector

SHOW HOLLYWOOD HOME MOVIES AT HOME!

Mickey, Donald Duck, Three Monkeys, Oswald Rabbit, Westerns, Dramas, Aviation and many other featured subjects. 8MM and 16MM.

At your dealers or direct.

HOLLYWOOD FILM ENTERPRISES, Inc.
6060-B Sunset Blvd. Hollywood, Calif.



35 mm. ROLLS DEVELOPED AND 36 PRINTS 3" x 4" 90¢

36 exposure rolls: Argus, Leica, etc. (except "Mercury") fine grain developed (Eastman DK-20) and beautifully enlarged to 3" x 4", 90c. Cartridge reloaded with Eastman Plus X, 35c. 18 exposure rolls, 55c; reload 20c. Films permanently protected by revolutionary CRYOLYTE Process. Fast Service. Satisfaction guaranteed. Free mailing bag, sample print. Write:

TECHNIFINISH LABORATORY
35mm. Candid Camera Specialists
623 Brown St. Rochester, N. Y.


# Seven Methods of Correcting Your Negatives

(*Continued from page 29*)

fog present, the border of the negative will be perfectly clear and transparent, (excluding light-struck edges), though not necessarily colorless. Fill the jar with cleaning solution P-2. Place the negative in the jar with the emulsion side in, screw the cover on tight, and allow the negative to soak for a few minutes, occasionally inverting the jar. Remove the cover, pour the solution back into its bottle, and rinse the negative twice without removing it from the jar.

**Dilute Bleaching Solution—P-1A**

**One part bleaching solution P-1 to three parts of water. This solution can be used repeatedly and keeps indefinitely.**

Fill the jar to the top of the negative with dilute bleaching solution P-1A, screw the cover on tight, and apply *special agitation*, watching the border of the negative and particularly the end borders each time they project up out of the solution. When the border is completely bleached and no longer bears a grayish tinge, (pay no attention to light-struck areas or edges), return the bleaching solution to its bottle. Rinse the negative three times, wash twice, then transfer the negative to your standard fixing bath where it should remain for a couple of minutes. Wash thoroughly, blot, and dry. The border of the negative will be transparent, and the contrast of the negative will be reduced somewhere within the range of 5 to 15%, depending upon the amount of fog which was present.

The negative illustrated in Fig. 1 was cut into three sections, of which section 1 is the original untreated portion of the negative. Both fog and overexposure are present. Section 2 was treated by Method I, limited to the removal of the fog alone, the overexposure being retained for the next treatment, Method II. In this operation the density of the sky was reduced 17% while the contrast of the negative was reduced 9%. Due solely to the removal of the fog, prints and enlargements made through section 2 require only 57% as much exposure as was required with the original negative.

### METHOD II. Removing Overexposure with Coincident Reduction in Contrast of the Negative.

Overexposure is easily recognized in any negative. If the deeper shadows (more transparent areas) in the negative are noticeably more dense than the border, the additional density is due to overexposure. Proceed exactly as for removal of fog, Method I. Instead of watching the border, however, watch the deeper shadows. When they are bleached through, and while the delicate shadow details within those deeper shadow areas are still gray or unbleached, return the bleaching solution to its bottle and proceed with rinsing, washing, and fixing, as prescribed in Method I.

Section 3 of Fig. 1 shows the results of this treatment. The density of the deeper shadows was reduced to 30% of that of the original negative. The required printing and enlarging exposures were cut to 26%, while the contrast of the negative was reduced to 85% of that of the original negative.

### METHOD III. Removing Fog, or Fog and Overexposure While Retaining the Original Contrast of the Negative.

**Hardening Solution—P-3**

| | Metric | Avoirdupois |
|---|---|---|
| Water | 500 cc. | 16 oz. |
| Sodium carbonate, des. | 2.5 gm. | 40 gr. |
| Formalin | 5 cc. | 80 drops |

**Should be renewed about once a week.**

**Standard Developer—P-4**

**Any standard M-Q developer, such as Eastman D-72 or Agfa 103, normal dilution of 1:2. For warm climates where temperatures cannot be readily controlled, use a tropical developer.**

**Special Control Fixing Solution—P-5**

| | Metric | Avoirdupois |
|---|---|---|
| Water | 500 cc. | 16 oz. |
| Sodium sulfite, des. | 50 gm. | 730 gr. |

**Keeps indefinitely and can be used repeatedly.**

After cleaning the negative in the cleaning solution P-2 and rinsing twice, fill the jar with bleaching solution P-1A, and screw the cover on tight. Occasionally invert the jar, until the negative is completely bleached and shows no trace of gray even in the densest portions. (For this treatment, and in other cases where special agitation is not prescribed, a stronger bleaching solution, such as 1:1 or 1:2 can be used to expedite the reaction. If the stronger solution is used, rinsing and washing must be increased proportionately, to about five times each.) Return the bleaching solution to its bottle, rinse three times, and wash twice.

Fill the jar to the top of the negative with the special control fixing solution P-5, screw the cover on tight, and apply *special agitation*. Watch the border of the negative if only fog is to be removed, or watch the deeper shadows if overexposure is to be reduced. When the border or deeper shadows, as the case may be, shows no further trace of milkiness (is clear and transparent), return the fixing solution to its bottle. Fill the jar with hardening solution P-3, screw the cover on, and treat for about three minutes with occasional inversion of the jar. Return the hardening solution to its bottle, rinse the negative once, then fill the jar with the standard developer P-4. Allow the developer to act until the negative is completely redeveloped. When the back of the negative shows full black in the densest areas (the change is through deep purple-brown to black), rinse the negative three times, wash twice, and it will be ready for drying.

In Fig. 2, section 1 is the untreated or original portion of the negative, having both fog and overexposure. Section 2 shows the effect of the treatment by Method III. Fog and overexposure have been eliminated, reducing the required exposure for prints and enlargements to 68%, while the contrast is identical to that of the original negative.

### METHOD IV. Reducing the Contrast of the Negative to Any Desired Degree.

Proceed according to Method II, but during the bleaching operation inspect the negative by transmitted light through the space between the ends of the negative. When the desired density or contrast is reached, rinse, wash, and fix.

### METHOD V. Increasing the Contrast of the Negative About 50%.

This method provides ample intensification with most negatives. No negative should ever be intensified if fogged. First remove any fog, then bleach throughout in solution P-1A. Rinse and wash as previously prescribed. Treat three minutes in the hardening solution P-3. Rinse once. Re-develop completely in standard developer P-4. Wash and dry.

### METHOD VI. Increasing the Contrast of Any Negative to Any Desired Degree up to About Four Times.

Negatives which have been treated by either Methods III or V are ready for extreme intensification. If the negative has been treated by Methods I or II, or has not been treated, first use Method V. If there is any fog or overexposure present, be sure to remove it before applying Method VI.

Re-bleach the negative in bleaching solution P-1A, rinse and wash as previously prescribed, treat the negative in the hardening solution P-3 for three minutes, and during this period prepare the following solution:

**Hydrosulfite Control Developer—P-6**

| | Metric | Avoirdupois |
|---|---|---|
| Water | 500 cc. | 16 oz. |
| Sodium hydrosulfite | 1 gm. | 15 gr. |

This developer should be prepared immediately before use as it loses strength rapidly. It can be used for several negatives in immediate succession, but should be discarded if it works too slowly or if the solution becomes slightly amber or brownish in color.

Return the hardening solution to its bottle, rinse the negative twice, then fill the jar to the top of the negative with developer P-6. Screw the cover on tight, and apply *special agitation*, watching the negative by transmitted light. When the negative reaches a tan color, the contrast will be slightly greater than that of the original negative. As the color becomes deeper, the contrast gradually increases, eventually attaining a maximum contrast equal to about four times the original contrast of the negative. Rinse the negative three times, wash it twice, and it is ready for drying.

If, upon testing the negative by printing or enlarging you find that sufficient contrast was not developed, merely make up a solution of P-6, and continue the development to a deeper stage. No bleaching is necessary. On the other hand, if you find that you have developed too much contrast, just re-treat the negative by Method V. The reduction will be a mean between the contrast developed by Method VI and that of the original negative.

In Fig. 2, section 3 was first treated by Method II followed by Method V, and then by Method VI to a maximum. The extreme contrast of this section is best exhibited in Fig. 2a, which is printed on Velox grade F-2 paper. In section 3, as will be seen, all fog was removed; the opacity of the sky was increased 50 times; the density was increased from .7 to 2.4; and the contrast of the negative was increased 3.5 times. Fig. 2b is a print made from section 3 on grade 0 paper. Compare this print with the one made on grade 2 from the original negative section 1.

If the fog and overexposure had not first been removed, this section 3 would have been so extremely dense throughout as to be virtually unprintable. Elimination of fog and overexposure invariably improves the printing and enlarging quality of a negative and reduces the required printing and enlarging exposures to a worthwhile degree.

### METHOD VII. Intensifying Weak Shadow Details While Simultaneously Reducing Excessive Highlights or Light-Struck Areas.

**M-Q Control Developer—P-7**

**Eastman D-72, Ansco 103, or any similar M-Q developer diluted 1 part of stock solution to 24 parts of water, or, 3 parts of a 1:2 solution to 22 parts of water.**

Treat the negative as prescribed in Method V, except that instead of using the standard developer P-4, fill the jar to the top of the negative with the control developer P-7. Screw the cover on tight, apply *special agitation*, and watch the delicate shadow details in good artificial light. As soon as these delicate details develop to a full black while the harsh highlights are still undeveloped or are in the purplish-brown stage, pour off the developer. Rinse a few times, then transfer the negative to your standard fixing bath for a few minutes. Wash the negative thoroughly, and it will be ready for drying.

Fig. 3 clearly illustrates how an apparently worthless negatives can be improved. Notice the extremely harsh background and complete lack of brilliancy in the principal subject in A, a negative which is completely out of balance. Notice how the extremely harsh highlights have been depressed in C, while all other details have been well intensified. Prints B and D are made on the same grade of paper. The negative was initially treated by Method VII as there was no noticeable fog present, followed by Method VI, which resulted in high contrast, and finally by Method V which balanced the negative for printing on grade 2 paper.

Negatives can be treated and re-treated until the desired result is attained. Diagnose your negative carefully before applying any corrective measures, then follow the instructions implicitly. Remember that if a negative is worth correcting, it certainly merits painstaking and careful treatment. The methods outlined here provide means for rectifying errors made in exposure or development.—


**WE'LL SELL YOUR CAMERA . . . AT YOUR PRICE!**

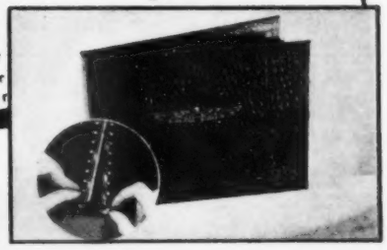
Here's the idea: Send us your camera, and tell us how much you want for it. We'll advertise it for you, free of charge, and when it's sold, we will send you the full price, less our commission. To protect your camera fully, we "Bond" it while in our possession. Below are some of the cameras we have for sale which were sent in by owners throughout the U. S.

| | |
|---|---|
| Kine Exakta; F/3.5 Exaktar lens | $125.00 |
| Contax II; F/1.5 Sonnar; case | 225.00 |
| Robot I; F/2.8 Tessar; case | 65.00 |
| Contax III; F/1.5 Sonnar; case | 275.00 |
| Robot II; F/2.8 Tessar; case | 125.00 |
| Rolleicord II; F/3.5 Triotar; case | 100.00 |
| Leica G; F2 Summar; case | 160.00 |
| 6x13 Ica Polyscop; F/4.5 Tessar; magazine; case | 85.00 |
| Cine Kodak Model B (16mm) F/3.5 lens | 15.00 |
| R.B. Auto Graflex (4x5) F/4.5 B & L Tessar; F.P.A. | 140.00 |
| Jiffy Kodak 616 | 6.00 |
| Mentor-Reflex (2¼x3¼) F/4.5 Tessar; Compur; F.P.A.; 3 holders; case | 50.00 |
| Parvola A (½ V.P.) F/3.5 Tessar | 35.00 |
| Super Sport Dolly (2¼x2¼) F/2.8 Tessar; Compur | 60.00 |
| R.B. Series B Graflex (3¼x4¼) 6¾"; F/4.5 Kodak Anast.; F.P.A. | 75.00 |
| V.P. Ihagee; F/6.3 Anastigmat; Vario. | 15.00 |
| Ideal B (9x12) F/4.5 Tessar; F.P.A.; 3 holders; case | 75.00 |
| R.B. Super D Graflex (3¼x4¼) 6" F/3.5 Tessar; with Graflex Synchronizer | 175.00 |
| Super Ikonta C; F/4.5 Tessar; case; acc.; enlarger | 65.00 |
| 4x5 Anniversary Speed Graphic; 5¼" F/4.5 Dominar; Compur; Kalart R.F. | 125.00 |
| 3¼x4¼ Anniversary Speed Graphic; 5" F/4.7 Ektar Supermatic; Kalart R. F.; Graflex flash | 150.00 |

**HENRY HERBERT**
485 Fifth Avenue, New York, N. Y.

**AMERICA'S SMARTEST AND MOST CONVENIENT PHOTO ALBUM!**

**"GENERAL" LOOSE-LEAF PHOTO ALBUM OR SCRAP BOOK**



Featuring the famous "Swing-O-Ring"—a Flick of the Finger swings the page out when desired! More convenience, more good looks, more value have been packed into the "General" than probably any other album you've ever seen. Made to last a lifetime, it has 50 black or grey album sheets. Pages lie perfectly flat, offering maximum visibility. They won't tear or turn up at the corners. Take them out or put them back in a jiffy. Locked securely by multiple rings so they won't fall out.

**$1.95** *Postpaid 8½x11*

Order for yourself, and as a grand gift for the Boys in the Service. Handsomely covered in black, navy blue or maroon simulated leather.
Other sizes: 10 x 12, $2.95 . . . 11 x 14, $2.50 . . . 14 x 11, $2.50 . . . 12 x 16, $3.25 . . . 14 x 18, $4.50.

*Order direct. Specify color of pages and cover. 10-day money-back guarantee.*

**GENERAL LOOSE LEAF BINDER CO.**
350 FIFTH AVE. EMPIRE STATE BUILDING, N. Y. C.

IN MARCH WITH THE TIMES

MARSHALL presents KHAKI COLOR

For coloring photographs of those gallant Americans in uniform

- Like all Marshall colors, it is transparent, permanent, and easy to use.
- For other uniform color problems, write our color consultant. We have a color to fill every need.
- Like Marshall's colors, Marshall's photographic chemicals represent the finest ingredients accurately compounded.
- Buy them at your dealer. Send for catalog.

JOHN G. MARSHALL, Inc.
167-173 N. Ninth St.
BROOKLYN, N. Y.

Quality Only!
DEVELOPED Ultra Fine Grain
ENLARGED To 3½"x5"
VAPORATED To Preserve Film
35MM FILM INCLUDING UNIVEX
All films carefully processed in fresh clean chemicals—and printed by photo cell exposure to 1/100 of a second precision accuracy—attention given to details in washing—drying—servicing—you pay for the best—you get the best—no bargains—no reductions—but a price sufficient to cover the type of work done—try it and see.
$1.25 CASH OR C. O. D.
Cash orders returned postpaid.
All work guaranteed.
WALTER LABS. 1008 Glenmore Ave. Brooklyn, N. Y.
MAILING BAGS ON REQUEST FREE!

35MM BULK FILM
EASTMAN PLUS X & SUPER XX
3 Cartridges.....$1.00
25 Ft.....$1.00 | 100 Ft.....$3.75
FREE, with 50 and 100 Ft. orders, Eyemo Metal spool free when requested.
Mail Orders Promptly Filled P.P.
FILM CENTER RELOADING SERVICE
Box 272 Station O N. Y. C.

FREE 8x10 ENLARGEMENT
with your first order of $1—or more!
35MM 36 exp. rolls f.g. dev., enl. to 3¼x4½ s.w. glossy.... $1.25 d.w. velvet.... 1.50
35MM services from 45c to $2—and FINE GRAIN ROLL FILM services from 30c up! Special savings on ENLARGEMENTS. Have your next roll processed THE BETTER WAY and write for FREE sample, price list and mailing-bag to
SPIRATONE FINE GRAIN LABS.
Dept. P-10, 49 W. 27th St., New York, N. Y. MU 4-1329

40 Actual Photographs of Ghost Town. Most Unique Town in Southern California; also, 36 Page Illustrated Magazine, all for $1.00.
GHOST TOWN "PITCHUR GALLERY"
Located at Knott's Berry Place
BUENA PARK, CALIFORNIA

SELL YOUR PICTURES
WRITE FOR DETAILS AND FREE MARKET LETTER
Free-Lance Photographers Guild, Inc.
219 E. 44th St., Dept. Z, New York, N. Y.

## Save That Print!

(Continued from page 32)

For use, dilute one part of the stock solution with twenty parts of water. Visual changes in the print image can be detected after about 15 seconds. The desired amount of reduction will probably occur within four minutes and may take place in any type of light.

For most instances of slight reduction (either when the entire print or only local areas are to be lightened), this reducer will be satisfactory. It has the property of "eating away" the highlight portion of the image first so that the effective print contrast becomes appreciably increased. This effect is often used where it is desirable to clear out small highlights, thus adding to the brilliance of the print. It is also employed in giving flat, dark prints and lantern slides more "snap" and brilliance, but it can improve prints of line copies. Here the whites are perfectly cleaned of all processing fog, while the blacks are not appreciably altered.

Farmer's reducer often finds use in many unexpected instances. If you do not have a paper contrasty enough to print an unusually soft negative, intentionally overexpose the print about 100%, using the available grade of paper contrast, and then reduce it back to normal. Many salon workers find that immersing their prints in a weak solution of the reducer just long enough to lighten the highlights adds considerably to the print quality.

A slight staining action may be noticed when this reducer is used on areas of low density on a white-stock paper, but even if present, this stain is very slight and the print can be reduced with entirely satisfactory results. The stain is probably not due to the action of the reducer itself but because the removal of the silver print image reveals the light yellowish oxidation products of the original print development. In many instances it not only is undetectable, particularly on prints of a warm tone or those made on a buff or cream paper stock, but it also may add a pleasing warmth to the image.

**1—b. The print is overexposed and developed normally.**

This type of print is equally dark as those in the 1-a classification, but differs in that the "muddy" quality is lacking. The brightness differences are approximately correct, as the print was made on the correct grade of paper and was developed normally, but the density level needs to be made somewhat lighter.

REMEDY: A proportional reducer, such as potassium permanganate, should be used. This is made up just prior to use as follows:

| | |
|---|---|
| Potassium permanganate | 0.5 gm. |
| Sulfuric acid, 10% | 25.0 cc. |
| Distilled water | 500.0 cc. |

Always add the acid to the water, never water to the acid. For use, dilute 1 part of the stock solution to 15 parts of water.

Proportional reduction has its valuable application in instances when the print should be lightened without appreciable contrast (gradation) alteration. The permanganate solution is especially recommended for this purpose. Although the working bath may appear to be a messy purple concoction, it serves this reduction purpose admirably. The continuing action present in many reducers is not objectionable here, particularly with fairly dilute solutions. If the bath should become brownish in the slightest degree, it means that exhaustion has started to take place and that a new batch of working solution should be prepared immediately. After reduction has been completed, the print is immersed in a weak solution (5%) of sodium bisulfite or ordinary acid fixing bath; this will completely eliminate any of the residual permanganate. After being thus treated, prints are washed and dried in the usual manner.

**2. The normally exposed print has been overdeveloped.**

As continued development increases the depth of the shadows proportionally more than it does the highlights, particularly in bromide prints, prints of this type are recognized by heavy, blocked-up shadows in which much of the detail is so dark as to be indistinguishable.

REMEDY. The only non-staining reducing agent that will satisfactorily reduce the shadows without affecting the lighter portions of the print is ammonium persulfate. The formula is as follows:

| | |
|---|---|
| Ammonium persulfate, pure | 40.0 gm. |
| Distilled water | 500.0 cc. |
| Sulfuric acid | 1.5 cc. |

For use, dilute one part of the above stock solution with two parts of water.

Just why this reducer should affect the heaviest densities instead of the lighter areas is not fully understood by photographic chemists, but the fact remains that this unique solution is extremely valuable for serving this purpose accomplished by no other known chemical.

At the recommended strength, this solution acts the slowest of the three mentioned reducers. For this reason several prints can be treated at one time—a practice not recommended with ferricyanide and hypo. The use of this "super-proportional" persulfate solution often results in greatly improved prints, not only in producing a more desirable (lighter) average density level in dark prints, but shadow details, once given up for lost, often seemingly appear from nowhere. This phenomenon is due to the fact that the shadow details often extend below the visual level of the maximum black. When a sufficient amount of this "top" silver has been removed from the dense areas, the details once again become apparent and add to the quality of the picture.

**3. Normal exposure, excessive paper contrast.**

As in cases of overdevelopment, excessive paper contrast yields prints that have blocked-up shadows. Although the highlights still may have a few details,

**HAVE YOU A CONTAX III?**

**That Contax and its Accessories May Bring You *All* the Items On This List**

**STILL EQUIPMENT**

- 3¼ x 4¼ Anniversary Speed Graphic
- Zeiss Tessar f:3.5 lens
- Coupled rangefinder
- Mendelsohn Speedgun
- 2 12-septum cut-film magazines
- 3 cut-film holders
- Lens hood and K-2 filter
- Leather hold-all

**MOVIE EQUIPMENT**

- Bell & Howell 141, 16 mm. magazine movie camera
- Bell & Howell Lumax 1.9 lens
- Magazine critical focusing device
- Bell & Howell viewer, splicer, and rewind

**Army officer seeking light, portable equipment will trade all these items in excellent condition for a Contax III complete with accessories all in first class shape. Send full details of your offer to Box W1042, c-o POPULAR PHOTOGRAPHY, 540 North Michigan Avenue, Chicago.**

**35 M.M. FILM ULTRA FINE GRAIN**

**$1** Developed, Printed, Vaporated

**CUSTOM QUALITY WORK**

Rosa R. Ray

Your 35 MM roll ultra fine grain processed and each exposure enlarged to 3¼x4½ on deckle-edged gloss or matte paper — only $1.00. 18-Exposure, 60c. 16-Exposure, 50c.

Reloading with Eastman Film: 36-exp., 50c; 18, 30c.

**24-HOUR SERVICE** in today—out tomorrow **Leaders since 1920**

**RAY'S PHOTO SERVICE** Dept. 22-D LA CROSSE, WIS.

**New! Interior or Exterior ART NEGATIVES**

Beautiful Hollywood Professional Models Photographed from Life

Set of 3¼x3¼ Neg....4
Set of 2¼x1⅝ Neg....6
Set of 35mm Neg.....10

**FOR $1.00 PER SET** (state size and type wanted)

**FREE!** PRINTED MODEL RELEASE FORMS UPON REQUEST (With Order)

**HOLLYWOOD NEGATIVE SERVICE**
P. O. BOX 789-P HOLLYWOOD, CALIF.
(Calif. Buyers add tax)

**WRITE US FOR PHOTO EQUIPMENT**

Nationally known new and used cameras, lenses and photographic equipment at lowest prices. Old equipment accepted in trade.

**CAPITAL CAMERA EXCHANGE**

Largest Stock of Cameras and Equipment in the South

1003 PENNSYLVANIA AVE. N.W., WASHINGTON, D. C.

**FREE CARTRIDGE REFILL** 35 M.M.—36 EXPOSURES

**DEVELOPED** FINE GRAIN PROCESSED
**ENLARGED** BEAUTIFULLY ENLARGED TO 3¼" x 4¼"
**RELOADED** WITH ANY KODAK OR AGFA FILM

**$1 FOR ALL**

18 Exposures processed and cartridge refilled for 75¢
Write for mailing bag — Returned Postpaid

**HUB Mail Film Service** ESSEX STA., BOX A BOSTON, MASS.

**35MM FILMS** DEVELOPED & ENLARGED ONLY **$1.25**

Send your 36 exposure roll to us. You'll get professional fine grain developing vaporated to prevent scratching, with each good exposure enlarged to 3¼x4½. We do not use automatic or mass production machinery but each negative is given individual attention by our craftsmen. 18 exposure roll 70c
Beautiful 4x6 enlargements (Not oversized prints) from 8 exposure roll—35c
One day service Free mailing bags

**UNIVERSAL PHOTO SERVICE, Box 612A**
La Crosse, Wisconsin


the prints give an objectionable "soot-and-whitewash" appearance. In extreme cases, even the right type of reduction is of small value and a print of this type is usually regarded as hopeless. If necessary, a new print should be made. On the other hand, where the contrast is only slightly apparent, the print can be saved.

REMEDY: As the shadows usually need corrective measures the most, the print is reduced in the persulfate solution described in Section 2.

### Local Print Reduction

In case only a particular area of a print should need reducing, such as portrait highlights or emphasis of clouds in a landscape, this can be accomplished by means of small wads of cotton that have been dipped in a weak solution of the proper reducing agent and applied to the print that previously has been soaked, wiped dry, and placed in a horizontal position. At no time should a pool of the reducing solution be allowed to stand on the face of the print. This will cause uneven and splotchy reduction with the outlines of the pools showing plainly. Fine print details can be worked upon in this manner, utilizing small spotting brushes, which should be thoroughly rinsed in water after use.

The action of the reducer should be arrested just *prior* to the instant you believe the print to be sufficiently treated. The action is stopped by immediately placing the print under a stream of running water. This procedure is necessary because there may be a slight continuance of the reduction due to the chemicals that have infiltrated into the paper and emulsion structure, and it takes a short period of time before the water can replace them sufficiently to halt the reduction. It may be best to reduce the print in successive stages rather than at one operation, as the degree of reduction can then be more easily controlled.

In all instances the amounts of chemicals in the above solutions are both comparatively small and inexpensive, while the formulas themselves are easy to compound and fun to use. Together, intensification and reduction of prints make a valuable means of permitting more economy in the darkroom that should be increasingly practiced by both amateur and professional photographer.—

## Self-Portrait Method

IT IS entirely possible to make closeup self-portraits without the use of mirrors, remote releases, or other devices. First, hold the camera at arm's length, and have another person measure the distance from your face to the lens. Once this measurement is made, you won't have to do it again. When you know what the distance is, find out whether or not your camera will focus that close. If not, slip on a portrait attachment and set the focusing scale accordingly. You can center the image of your face and watch your own expression by looking at the reflection in the camera lens. Self-portraits can be made quickly in this way wherever there is sufficient light.—*J. J. James, Elyria, O.*


**COLOR CAMERAS and EQUIPMENT**

Fotoshop maintains the largest and most complete Color Photography stock in the Nation. Whether your need ranges from a simple squee-gee to the finest make of color camera, Fotoshop is the place to buy. You won't be disappointed!

**75 CAMERAS TO SELECT FROM!**

***A few outstanding bargains:***

**SINGLE MIRROR**

CURTIS KD, new—with Kodak Anastigmat F:4.5 lens in Compur Shutter. **$122.00**

**TWO MIRROR**

6.5 x 9 DEVIN Precision, Goerz Dogmar telescopic Range Finder..... **259.00**
3¼ x 4¼ NATIONAL Featherweight, Goerz Dogmar F:4.5, 8½" lens.... **395.00**
5 x 7 DEVIN Precision, Goerz Artar in Compur Shutter, like new..... **695.00**
5 x 7 NATIONAL, factory reconditioned, with lens..... **595.00**

*Send for complete List, C-10*

**COLOR KITS**

Isocolor, Reg. $5.95.....Now **$2.49**
Wash-Off Relief Kits..... **4.95**
also Curtis, Devin McGraw Carbro, National Carbro, Colortone, etc. at greatly reduced prices. *Send for List, C-11*

**COLOR EQUIPMENT**

Curtis Color Printers..... **$9.95 and up**
Densitometers..... **17.00 and up**
also, Color Analysts, Voltage control, etc.

*Send for List, C-12*

**A NON-PROFIT FOTOSHOP FEATURE!**

to aid those who are first becoming acquainted in Color, SEPARATION NEGATIVES — contact separations made with finest densitometric control. Price, contact, $1 per set for any size Kodachrome up to 4x5, 35mm and Bantam enlarged, maximum 4x5, $1.50 per set. Actually worth $5.

*"the Nation's Color Headquarters"*
42nd STREET
**FOTOSHOP** INC
**18-D East 42nd St., N. Y. C.**

***Camera-shy?***
**Now You Can Take Such *Swell* Pictures!**

Now at last you can get make-up specially developed for *your* black-and-white photography. Subdue bad features, achieve flattering movie-quality pictures and save retouching!

Hampden's Photographic Make-up is a complete easy-to-use kit for all your make-up needs. It comes in the new stick form with full instructions on how to use!

Creamy • non-greasy • blends perfectly • easy to remove • conceals minor defects • gives the skin a beautiful, smooth, satiny finish.

Save time, trouble, wasted film and have more beautiful, natural-looking pictures. Get *your* kit at any photographic store or from Hampden Sales, 251 Fifth Ave., New York.

Write for FREE Illustrated Booklet

**$2.00**

**POWD'R-BASE *hampden***

**PHOTOGRAPHIC MAKE-UP**

Save Scratched Negatives WITH SCRATCHPATCH!

Don't throw away your scratched negatives, use SCRATCHPATCH. A scientific chemical solution that will not harm your negatives yet it makes bad scratches disappear like magic. Get a bottle of SCRATCHPATCH from your camera dealer today.

*If your dealer does not carry SCRATCHPATCH—send 50c and we will mail a bottle postpaid.*

MANUFACTURED EXCLUSIVELY BY
ELECTRONIC PRODUCTS MFG. CORP.
ANN ARBOR, MICH., U.S.A.
*Manufacturers of Vokar Cameras and Projectors*



8 x 10 (TRIMMED) NATURAL COLOR REPRODUCTIONS

from KODACHROMES

$2.50 EA.

• From any size Kodachrome up to 4x5—finished on 12x14 salon-type mounts. Any portion can be enlarged for best composition. Send one or more slides today. SATISFACTION OR YOUR MONEY BACK. Color prints finished in 4 to 5 weeks.

When 2 or more of same or different transparencies are ordered.

SINGLE PRINTS $3.00

35mm ENLARGEMENTS

36 (3½ x 5) Individual Panel Prints in Leatherette Album $1

Individually printed by automatic "electric eye." Fine-grain processed. Delivered postpaid.

(*Mercury Films same price.*)

PANEL PRINTS IN ALBUM

15-18 exp. rolls enlarged to 3½x5 ..... 60c
10-12 exp. rolls enlarged to 3½x5 ..... 50c
ANY 6 or 8 exp. roll developed and printed ..... 25c

Send coin (no stamps). Min. order, 25c

PHOTO LAB., Inc. Room 1100, 3825 Georgia Ave., Washington, D.C.

8mm—16mm—35mm
Kodachrome
OF THE BEAUTIFUL
CAVERNS of LURAY

This extremely interesting and most unusual film will make a valuable addition to your film library.

36 2x2 Kodachrome Slides, 4 for ..... $ 1.00
100 Feet 16mm Kodachrome, Postpaid ..... 10.00
50 Feet 16mm Kodachrome, Postpaid ..... 6.00
50 Feet 8mm Kodachrome, Postpaid ..... 6.00
25 Feet 8mm Kodachrome, Postpaid ..... 3.50

Address LURAY CAVERNS, LURAY, VA.



35 MM FILM

25 Feet $1.00 — PLUS X, SUPER X, DUPONT 1, DUPONT 2 — 100 Feet $3.00

ALL OTHER FILM $1.25 for 25 ft. 4.25 for 100 ft.

35 MM FILM EXCHANGE
BOX 2910 HOLLYWOOD, CALIF.


## Movie Titling

(*Continued from page 51*)

ing the picture as a negative, or by making negative enlargements on bromide paper of selected and suitable frames in the movie reel itself.

A third way is to use a regular still camera negative in the titler, with lettering done on a piece of celluloid or cellophane and placed in front of the negative. This setup is lighted from the back of the title, using one lamp about a foot away from the title and diffused with a piece of ground or opal glass. In all cases where photographic backgrounds are used with positive film, the background should be on the light side so as to photograph dark to make a contrasting background for the lettering.

In lighting title cards, regular floodlamps are used. A good setup for the small metal titlers is to use two No. 1 lamps in small reflectors a few inches from the card. Exposure for normal speed will average around *f* 8 or even *f* 11. For the larger cards and titlers, the lamps are placed about fifteen inches away, and exposure will average about *f* 5.6 or *f* 4. The speed rating on positive film is higher than most amateurs think, when it is used for titling. A Weston rating of 6 is about right, when a good contrasty developer is used.

Developing titles is easy. All you need are a couple of trays and a darkroom light—a ruby bulb or an orange-green screen such as the Wratten OA—some developer, and hypo. Either D-11 or D-72 used undiluted will give good contrast with positive film. The hypo is the standard acid-fixing bath. Short strips of film are developed easily by laying them on edge in a tray. Where longer pieces are to be processed, some kind of a rack to hold the film will be necessary.

A simple rack can be made from two strips of wood and three short lengths of dowel sticks as shown in the accompanying illustration. Small brads or old phonograph needles driven into the two end dowel sticks keep the film separated while being handled. A piece of film serves as a guide in placing the pins. A coat of paraffin provides the easiest method of waterproofing the rack.

Now let us follow the step-by-step procedure of making a positive title. First, the titler is set up and the prepared title card set in place. An experimental strip of film should be exposed to determine the correct exposure and development time. The easiest way to do this is to rule a white card with squares drawn with black India ink. Have one square in the approximate center entirely opaque. The camera is taken into the darkroom and with only the safelight on, a piece of positive film about two feet long is placed in the camera. Film this short does not have to be on a camera spool. Merely coil it up around the feed spindle and run through the camera gate as usual.

After the lights are arranged on the titler, trial exposures are made on the white, ruled card. Take a few frames at


CASTLE'S LATEST RELEASES

"Fight for Egypt"
"Sports Spellbinders"
"African Pygmy Thrills"

On Purchase & Exchange Plan
In 8mm—16mm Sound & Silent
Best Releases
Mostly Castle & Official

Write for full details and catalogue of 200 subjects of every description

COSMOPOLITAN FILMS
3248 Gratiot Ave., Detroit, Mich.



FREE! Lafayette Camera's new BARGAIN CATALOG

LOADED WITH SENSATIONAL "MONEY-SAVING" VALUES

• Page after page of Bargains in fine Cameras, Accessories and Darkroom Supplies. Profusely illustrated. Lowest prices! Complete stocks in Atlanta and Chicago assure prompt, fast service. Your old camera taken in trade. Every amateur should have a copy of this big bargain book. Stretch your photo dollar! Take advantage of these Lafayette bargains.

Write for Catalog P10 Today

LAFAYETTE CAMERA
901 W. Jackson Blvd. Chicago, Ill.
265 Peachtree St. Atlanta, Ga.



DOWNTOWN NEW YORK HEADQUARTERS FOR EVERYTHING PHOTOGRAPHIC

A LARGE STOCK for EVERY NEED
DARK ROOM EQUIPMENT—CAMERAS—PROJECTORS—ENLARGERS—ACCESSORIES

Write or call, get our LOW PRICES

*Liberal Trade-in Allowances* — *Cash for Your Used Equipment*

CAMERA EXCHANGE ORIGINATORS SINCE 18[illegible]
NEW YORK CAMERA EXCHANGE,
116 Fulton Street, New York City



CAPITOL ART NEGATIVES

★ ★ ★ ★

*"For capital prints use Capitol negatives"*

Our art figure photo negatives can't be beat. Most beautiful models in the East. All negatives on 35mm Plus-X fine grain developed. Guaranteed to make beautiful salon prints. $1 brings large assortment PLUS FREE Art Transparencies.

CAPITOL NEGATIVES
P. O. Box 182, Flatbush Sta., Dept. J, Brooklyn, N. Y.



35mm FILM ENLARGED TO 3½x5½

36 EXPOSURES $1.00
18 EXPOSURES .75c

ALL FILMS ULTRA FINE GRAIN
Developed & Treated with Teitel's SCRATCH PROOF Solution
AGFA, Notched & Numbered RELOADS 50c
Write for Mailing Bag & Price List

BELL'S PHOTO LABORATORY
BOX 51, STATION E, BROOKLYN, N. Y.



*If It's Worth Taking! It's Worth Quality Processing.*

FINE GRAIN PROCESSING—INDIVIDUAL SERVICE
All Miniature Films are VAPORATED and Individually Developed and Printed to assure MAXIMUM Detail. Prints analyzed for correct contrast paper. Dodging and Cropping too. MAILING BAGS SUPPLIED FREE. Prices on request.

FINEGRAIN PHOTO LABS.
307 5th Ave. New York City MU 4-1480



LENSES

ASSORTMENT OF 15 for $1.50 POSTPAID
(New, but edges very slightly chipped)

For copying, ultra closeup shots, macrophotography, portraits of babies and small pets, experimental optics, and for making a two power f/16 telephoto lens, Kodachrome Viewer, Stereoscopic Viewer, ground glass and enlarging focusing aids, 8 power telescope, pocketscope and for many other uses. Focal lengths 1 to 16 inches. Made of optical glass and finely ground and polished. Ten pages of plans and directions included. Satisfaction positively guaranteed.

EDMUND SALVAGE CO.
41 W. Clinton Ave., Dept. #1, Oaklyn-Audubon, N. J.

**LOANS TO BUY CAMERAS OR EQUIPMENT**

Need extra cash to buy a new camera, lens, enlarger, or other item? You can get up to $300 simply and privately. Equipment remains in your possession. Main requirement is a job or other source of regular income. Convenient monthly payments. Write for FREE booklet which tells how to get a loan to buy photo equipment. Send no money. Household Finance, Dept. PP, 919 N. Michigan Ave., Chicago.

**BULK 35 MM. FILM RELOADS**

GUARANTEED FRESH STOCK "RELOAD YOUR OWN"

GROUP NO. 1: E. K. Plus X, E. K. Super X, Dup. Sup. No. 1, Infra Red
25 ft. — $1.00
50 ft. — $2.00
100 ft. — $3.50

RELOADED CARTRIDGES 36 exp. each. We Supply Cartridges. Group 1— 3 for $1.00. Group 2— 3 for $1.25. Minimum Order $1

GROUP NO. 2: E. K. Panatomic X, E. K. Super XX, Agfa Supreme, Dup. Sup. No. 2
25 ft. — $1.25
50 ft. — $2.25
100 ft. — $4.00

Postpaid in U.S.A. California Buyers Add Sales Tax
PACIFIC COAST FILM CO., 1510 N. Sierra Bonita, Hollywood, Calif.

**"BETTER PICTURES" $1.00**

ANY 35MM. ROLL—36 exposures developed and printed to size 3¼x4½—$1.00. 18 EXPOSURE ROLL—60c. No. 127 SPLIT OR CANDID ROLL—16 exposures developed and printed to 3¼x4½ only 50c

Prints fine grain developed, enlarged, to give contact quality. Prompt Service. Send roll and money today.

ALL REPRINTS 3c EACH
VAPORATED — 10c Additional Per Roll
BETTER PICTURES
2523 Lawrence Ave., Dept. P, Chicago, Ill.
Send 5c stamps or coin to cover mailing charges.

**TRANSPARO Art Corners** Clear as Glass

Mount photos, stamps, covers, etc. with complete visibility - removable at will. Order of your dealer - or write Engel Art Corners Mfg. Co.
Dept. 30-K, 4711 N. Clark St., Chicago — 15c a boxette of 100

**35 MM FILMS**

Fine Grain Developed; Vaporated To Prevent Scratches... ENLARGED TO 3¼x4½

36 Exp. Rolls $1.25
18 Exp. Rolls 70c

8—4x6 Beautiful Enlargements from 8 Exp. Roll 35c or 8 Sparkling Prints 25c.

Individual attention to each neg. No mass production method. Beautiful quality prints guaranteed. Single wt. glossy paper 36 Exp. $1.25, double wt. portrait paper $1.75; 18 exp. Roll 70c. 1-day service. Reloading: 36 Exp. 60c; 18 exp. 40c Free mailing bags.

MINICAM PHOTO LABS.
Dept. 14 LaCrosse, Wis.

Preserve and File Your Negatives in Transparent
**GLASSINE NEGONTAINERS—$1 Buys:**
450—2¼x3, 2¾x3⅜, 2⅝x4, 2x3, 2x3½, 2x4, 2x4½.
400—2¼x4¼, 2¾x5, 2x5. 300—2x8, 2¼x6½, 2¾x7.
350—2x4½, 3x5, 3x5½, 2¾x5½, 2¾x6, 3¼x5, 2x6, 2x7.
250—2x9, 2x10, 2¾x8, 4¼x5½, 3¼x6¼. 200—4¼x6¾.
225—4¼x5¾, 2¾x8. 175—5¼x7¾, 3¾x11, 2⅞x14½, 2x14.
**PLYWOOD (MAPLE) FILING CABINET—$1.25**
Includes 100 Negontainers, 26 indexes! Set-in, dustproof cover; length 10-12 inches! Your choice, any above size! Photographers' Release Blanks, 30—25c; 200 for $1.00. All orders Postpaid! C.O.D.'s Accepted. Money Back!
ANDREW E. LUTZ, 414-C AVERY • Syracuse, N. Y.

**FINE GRAIN**

35 mm film Developed Enlarged 18 exposures **65c**
36 exposures **$1.00**

Generous 3¼ x 4½ inch enlargements by the radically new ELECTRIC EYE CONTROL, assuring you of beautiful, brilliant pictures from your negatives.
Agfa Supreme reloads—36 exp. 50c.
Send for FREE mailing bag and complete price list.
**BEST PHOTO SERVICE**
Box 5250
Metropolitan Station, Los Angeles

**EXTRA DOLLARS for YOU in PHOTO-JOURNALISM**

Magazines, newspapers, advertisers pay good prices for pictures with news or human-interest value. You can earn $15 to $50 extra, monthly. FREE booklet tells how we teach you—at home thru our course in photo-journalism—at low cost—what pictures to take, how to take them and where to sell them. Write TODAY!
UNIVERSAL PHOTOGRAPHERS, INC.
Dept. 2 10 West 33 St. New York City


each stop. After development of this test strip, the proper exposure can be determined. A properly exposed section should show a very black background with clear white lines. Overexposure tends to gray the white lines. Underexposure results in a weak background. The ruled lines will show the exact field covered by the camera lens.

The camera is now loaded with the positive film, which should be wound on an extra camera spool and threaded in the camera the usual way. After all the titles are exposed, based on the trial film strip, they are ready for processing.

The film is wound onto the developing rack in the darkroom. A simple stand to hold the rack makes this easier. The film is fastened to the rack by placing a sprocket hole at one end over one of the pins, or attaching it with a thumbtack. The film is wound on the rack emulsion side out. The last end can be held in place with another thumbtack; or a rubber band can be fastened to it.

The film is now developed in either D-11 or D-72, undiluted. The time with D-72 is two or three minutes, and with D-11, about five minutes, at 65 degrees F. Development completed, the film is rinsed in clear water for a few seconds and placed in a fresh hypo bath for five or six minutes. The film clears in about one minute in a fresh solution.

Washing can be done in a tray, changing the water every five minutes for a half hour, or in running water for about fifteen minutes. After washing is completed, the film is removed from the rack and fastened between two strings stretched parallel across the room about six feet from the floor. The film can be held on the strings by regular film clips, or small safety pins through sprocket holes. Remove excess water by wiping gently between viscose sponges. When dried, the film is cut apart and is ready to be spliced into the movie reel.

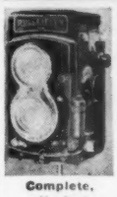
Final judging of the titles is best done by projection on a screen. Using a white card with black letters, if the lettering is a good white and the background black, the exposure and development have been correct. Gray letters and black background show overexposure, while white letters and gray background show underexposure. If both letters and background are gray, the film has been overexposed and underdeveloped.

Get a roll of inexpensive positive film, and try making your own titles by this easy method. You will be surprised at the professional results that can be obtained, while doing the whole job yourself.—

## Keeps Prints from Drain

MANY darkroom workers use print-washers in which a vertical drain or overflow tube maintains the desired water level. Frequently a drain device of this type will become clogged with prints, and this can result in the tank overflowing, damage to the print emulsion, and lack of proper washing of the prints themselves. A simple remedy is to fasten a film clip or a clothespin onto the top of the outlet. This keeps prints from covering the opening.—


**PROFESSIONALS WHO TAKE "PAGE ONE" PICTURES USE HEILAND SOL Flash SYNCHRONIZERS**



COMPLETE **$26.50**
Metal Lens Board extra. Deluxe Brackets extra.

Complete, attached, $42.75

Used exclusively by Time and Life. The U. S. Army Signal Corps, the U. S. Navy and the RAF include them among their photographic equipment.

Heiland Flash Synchronizers are adaptable to Leicas, Contax and Primarflex cameras. Write for prices.

**PRECISION CAMERA REPAIRS**

Cameras, Shutters, Range Finders. Now servicing Time, Life, and others.

**Automatic Diaphragm Control**

Enables you to focus single lens reflex camera with lens wide open and take photo at a predetermined aperture setting. Installed on Graflex, Primarflex, and all reflex-type cameras. **$40** UP

**CAMERA TECHNICIANS CO.**
*The Service Station for Heiland Flash Synchronizers*
521 Fifth Ave. New York, N.Y.

**MEYER PRECISION**
CAM-COUPLED RANGE FINDER
For Plate and Film Pack Cameras

There should be no doubt when you contemplate buying a Rangefinder—order a MEYER to-day—tomorrow may be too late.

Its micrometer-tested cam-coupled mechanism guarantees accurate focusing.

MADE IN U. S. A.

Write for circular

Meyer Lenses used the World over
HUGO MEYER & CO.
39 West 60-Street, New York, N. Y.

**IT WILL OPEN YOUR EYES! WITH VALUES and VARIETIES**

**WARDS CAMERA AND COLOR CATALOG**

FREE 12 HINTS TO BETTER COLOR PHOTOS included

Beautiful 1942 36 page Book planned for the needs of color photographers. Also B & W Movies or stills. Everything you need in cameras, accessories and supplies at Wards low prices to save you money. Chockful of more bargains than you ever thought available this year... and remember Wards offer

**LOW PRICES TERMS or CASH**

Get what you need while you can—Pay later on easy terms free of carrying charges on most orders. Many items sent POSTPAID. Satisfaction guaranteed on every purchase. Write Today for this Different FREE Book.

**MONTGOMERY WARD**
Photographic Dept. PP-1042-A Chicago, Ill.

1 2 3 4 5 6 7 8
Only
COLOR PRINTS, Inc.
HOLLYWOOD, CALIFORNIA
. . . gives you the finest professional 8"x10" wash-off relief enlargements for the lowest price.*
Original prints..... $3.50 ea
DUPLICATE PRINTS, ONLY $1.50 EACH
(Matte Finish Paper, 75c Additional)
Made from 35 mm. Kodachromes, or the 35 mm. area of a Bantam size, on quality semi-gloss PAPER and sent to you in fine removable mounts.
★ . . . because we are by far the largest producers of 8" x 10" wash-off relief prints in the world.
Send us your Kodachromes TODAY!
Write for Free Kodachrome mailing kit!
COLOR PRINTS, Inc.
1707 NORTH VERMONT AVENUE
HOLLYWOOD, CALIFORNIA

35 MM FILM developed and enlarged FINE GRAIN
• Any 36 Exposure Roll . . . fine grain developed, chemically hardened and brilliantly enlarged to 3½x4½ on double weight Matt or Glossy Paper. 18 Exposure Roll, 65c
MONEY BACK IF NOT SATISFIED
Send for Free samples, mailing bag and price list.
STANDARD FINE GRAIN SERVICES
DEPT. P, BOX 392, GRAND CENTRAL P.O. N.Y.C., N.Y.

2x2 KODACHROME SLIDES 50¢ EACH MIN. 12 ORD.
100 ASST. BEAT. ART KODACHROMES OF CALIF. MOST GORGEOUS MODELS
Hot Copies of Paintings or Calendar Drawings
BLACK & WHITE ART SLIDES 8 FOR $1. 25 FOR $3.00
CUSTOM CRAFT ORIGINAL ART NEGATIVES $2. per set of 20 35mm NEGATIVES or 5 large 116 size negatives
Made from Original ART KODACHROME. (Calif. Buyers Add Sales Tax.)
Hollywood TRANSPARENCY Company
5005 HOLLYWOOD BLVD. HOLLYD, CALIF.

GORGEOUS MODELS IN COLOR!
Hollywood's Most Beautiful Models Photographed in Kodachrome for Art Study!
2x2 Natural Color Art Figure Slides —All New! No Two Alike! Critical Detail—Sparkling Color! Some Posed in the Studio—Some Outdoors. 3 for $1.00, 7 for $2.00
2x2 Black & White Art Figure Slides! 35mm Art Figure Negatives! Fine Grain. Guaranteed to Make Salon Quality Enlargements! All New and Different! 10 for $1.00, 25 for $2.00
CINE ART
Box 328-B HOLLYWOOD, CALIF.

PROTECT FILMS AGAINST CLIMATE, SCRATCHES, STAINS, FINGERMARKS—THE WAY THE U. S. GOVERNMENT AND THE HOLLYWOOD PRODUCERS DO
MOVIES PEERLESS STILLS
VAPORATE FILM TREATMENT
ASK YOUR DEALER OR PHOTOFINISHER
VAPORATE CO., INC. 138 W. 46th St. New York, N.Y.
BELL & HOWELL CO. 1801 Larchmont, Chicago 716 No. Labrea, Hollywood

BARGAINS at LOTOCK

| | | | |
|---|---|---|---|
| Graflex D Rose X, 4.5-6", L.N. | $150.00 | Super Ikonta C Tess 4.5, L.N. | $79.50 |
| Ektra 1.9, Case, L.N. | 365.00 | Leica F. Blk., F2.5, Case, L.N. | 110.00 |
| Omega Super C 35M, Holder, L.N. | 135.00 | Leica F. Blk., F.2, Case, L.N. | 145.00 |
| Perfex Turret, F2.8, L.N. | 50.00 | Kodascope EE, 750W., L.N. | 87.50 |
| 8X Colmont Bin, Case, | 40.00 | Zeiss Multiple Finder, L.N. | 21.50 |
| 8X Zeiss Bin, S.F., Case | 75.00 | Leitz 90M, F4 Lens, L.N. | 90.00 |
| 9x12 Zecca Zecomar, 4.5, L.N. | 49.50 | All since Speed Graphics in stock | |
| 2x2 Slide box, cap. 900 | 7.25 | | |

TRADE-INS—CASH FOR USED EQUIPMENT
LOTOCK CAMERAS, Inc.
135 E. 42nd St. (Chrysler Bldg.), N. Y. C. MU 4-7617-8

## Picturing Thoughts

(Continued from page 36)

ative into a confusing area of the first picture, or the whole point of your composite may be lost.

When you have selected a spot on the projected image where the "thought" picture is to be placed, take your vignetter mounted on its stand and adjust it until it holds back the light from this area. If the picture is best shown in a round area, cut a round vignetter. If some other shape is more desirable, cut a vignetter to fit. The vignetter should be small enough to permit holding it several inches above the paper, so that the edges of the projected image will not be sharp. This facilitates blending.

Next, take a soft pencil and mark on the paper you have fastened to the easel the portion covered or shaded by the vignetter. This gives you a guide for projecting the second negative, to make certain that it will be in the right place.

You are now ready for the first test exposure. Proceed as you ordinarily do in making straight projections, with this one important addition: don't forget to mark an "X" on the back and bottom of your paper before you put it into your easel. Otherwise you'll not know which is top or bottom when you come to project the second negative. Now, make a test strip, making sure to stop your lens down enough to give you at least a 5-second exposure. Mark at least three more pieces of paper, expose them all, and put them back into the empty box—*undeveloped*.

The next step is to remove the first negative, and set the vignetter aside. Put the second negative into your enlarger. The area into which it is to be projected, you will remember, already has been marked on the paper attached to your baseboard. For the sake of simplicity and also for better composition, you probably will use only a small portion of this negative. All you have to do is project it into the penciled circle until the effect pleases you. Now take a sheet of cardboard with a hole in it of the same size and shape as the vignetter, and hold it between lens and easel until you can shine only the portion you want onto the previously drawn circle.

The last step is an easy one. Take one of the previously exposed prints carrying the latent image of your first negative, and place it on the easel with the "X" at the bottom. Make the exposure for your second negative through the perforated cardboard, having fixed in your mind exactly where the penciled circle is, even though it is now covered by the sensitized paper. This one step is the only one in the entire technique which is left to guess-work, but it is not difficult. Make your exposure with the lens stopped down, giving the cardboard a slight circular motion so as to reach all edges of the vignette. Then, with your heart pounding and your knees slightly rubbery, slide the exposed print into the developer and watch impatiently for the image. The worst that can happen on

POCKET RADIO! or PURSE SIZE
About Cigarette Package Size! Requires no tubes, batteries or electric "plug in"—Wt. only ⅓ lb.—Streamline plastic case. An unusual novelty—receives local stations. SIMPLE—NO UPKEEP! Costs nothing to play — ever! OWNERS REPORT 2-3 YEARS' SERVICE — THOUSANDS SOLD. B. W. of Wisc., says: "WORKS SWELL"—!
— — ONE YEAR SERVICE GUARANTEE — —
Sent complete with midget individual earphone, Instructions, hook-ups, etc.—ready to listen! Easy Payment Plan as follows:
SEND ONLY $1.00 (cash, M.O., Check) and pay postman $1.99 plus postage on arrival or send $2.99 for postpaid delivery! Get your new Midget now—for real enjoyment. Ideal gift. ORDER NOW!
MIDGET RADIO CO., Dept. PP-10, KEARNEY, NEBRASKA

New Hollywood 2-way VIEWER
Affords extraordinary, crystal-clear magnification! Remarkable third-dimensional effect!
Ideal for KODACHROMES— .. or 35 mm. Strip Film
$2.45
AVAILABLE AT ALL BETTER DEALERS
CRAFTSMENS' GUILD
5773 WEST OLYMPIC BLVD.
LOS ANGELES, CALIFORNIA
.. OR SENT POSTPAID IF CASH WITH ORDER

FOR SUPER GLOSSY PRINTS with that professional finish
ACME
Heavy Duty Squeegee Plates
WILL NOT BLISTER OR PEEL
Play safe! Ask your dealer for ACME
Look for the name on the plate
ACME FERROTYPE CO., 50 Park Sq. Building, Boston, Mass.

35 MM BULK FILM
PLUS X; SUPERIOR 1, 2, 25 FT. FOR..... $1
50 FT.—$2.00; 100 FT.—$3.50
SUPERIOR 3; SUPER XX; PANATOMIC X; FINOPAN; SUPREME; ULTRA SPEED. 25 FT. FOR..... $1.25 P.P. or C.O.D.
50 FT.—$2.50; 100 FT.—$4.50
ALL CARTRIDGES—3 FOR $1.25
Bulk Film Winder—$3.95
100-ft. SUPREME or FINOPAN, $3.50
50 large lens tissue books 10c with film order
CAMERA MART, Inc., 70 W. 45 St., N. Y. C.

Free Lance PHOTO-ENGRAVING
Catalog FREE!
Amateurs, professionals, convert your knowledge of photography into cash! Be a free-lance photo-engraver. Establish your own part or full-time cut making business or work for others at good pay. Automatic equipment, complete home training at low cost. Full particulars and big 64-page illustrated catalog free! Send for your copy today.
TASOPE' Dept. 163 Aurora, Mo.

FILM DEVELOPED ENLARGED
8 BRILLIANT ENLARGED PRINTS (NEARLY POST CARD SIZE) 25¢
FREE! Send for Free Mailing Bags and Price List on 12, 16, 18 & 36 Exposure Rolls
PHOTO-ELECTRO, Box 861, Bridgeport, Conn.

END DAMP AIR WITH "DRI-AIR"
New DRI-AIR Powder draws moisture from air in dark rooms. Protects photo equipment and supplies against dampness. Set consists of 1 complete metal unit and 10 lbs. of powder. If dealer can't supply—Order direct, $3.70, plus ship. chg. DEALERS WRITE TODAY!
TAMMS SILICA COMPANY
228 N. LaSalle St., Chicago, Ill.

POSITIVES FOR SLIDE PROJECTION
These Positives are made on NON-INFLAMMABLE SAFETY STOCK from your 35mm or Bantam negatives. They have the same fine grain as your negatives. You can project our positives to any size.
35MM (36 exp.).....50c
Three rolls.....$1.25 : Five rolls.....$2.00
Bantam.....25c per roll
SINGLE FRAME, 5c EA.; MINIMUM ORDER, 50c
SEND YOUR ORDER TODAY
→Money Back Guarantee: Negative Returned Intact
Projection Slide Co., Box 319, General P. O., N. Y. C.

CAMERA REPAIRS
Bellows Made To Order
Shutters repaired. Prompt expert service. All makes. Low cost. Fully Guaranteed.
WRITE TODAY FOR FREE estimate. Give make and model.
UNITED CAMERA Inc. P1515 Belmont CHICAGO

35 mm ROLLS **DEVELOPED FREE**

Pay only for what you get. Maximum charge 36 Exp.—$1.00, 18 Exp.—60c. Univex rolls—$1.50. Our rate is 4c per print. If less than 25 negatives are good, we issue 4c credit per print. Enlarged to 3¼ x 4½, with Photo-Electric Eye. Velox paper only. High class work guaranteed. D.K. 20 Fine Grain Developing 24 HR. SERVICE GUARANTEED. SAVE MONEY. Send roll and $1.00 today. (Or sent C.O.D. plus postage.)

**MINIPIX LABORATORIES**
P. O. Box 1144, DEPT. 210 CHICAGO, ILL.
Copyright 1939, Minipix Laboratories

**ART PHOTO NEGATIVES**
**MADE BY MASTER PHOTOGRAPHERS**
*for Students and Collectors*

●● Models lovelier than any you've seen anywhere—fine grain developed—easily enlarged to 11x14 with Amateur Equipment—priced low, but of definitely superior quality.

2¼" size, 5 for $1, 12 for $2.

*Special! Duo-Subject Negatives*

Information and **FREE** sample of our amazing **NEW** Duo-Subject Negatives, the latest and greatest development in Art Negatives, sent with all $2.00 orders. No post card inquiries. Order yours today while our supply lasts.

**EXCEL PHOTO SERVICE**
**Box 52-R, Station X, New York, N. Y.**

**ART NEGATIVES**

Fine grain negatives for use in your enlarger or contact printer. Make sharp, salon prints of *PRETTY MODELS* with your own equipment. Negatives are 2¼x2¼". *SAMPLE SET OF 6 FOR $1.* Single Sample, 25c. FREE 35 mm Art transparency with sample set of six for $1.

**6 for $1**

***Big Free Negative Offer***
Details sent with all $1 sample orders.

**RADIO CITY NEGATIVE COMPANY**
**Box 123, Canal St. Sta., Dept. C-J**
**NEW YORK, N. Y.**

**MAKE MONEY COLORING PHOTOS at Home**

Fascinating new occupation quickly learned by average man or woman. Work full or spare time. Easy to understand method brings out natural, life-like colors. Many earn while learning. No canvassing.

*Easy to Learn*

**Free Book** tells how to make good money doing this delightful home work for studios, stores, individuals and friends. Send today for your copy. No obligation.

**NATIONAL ART SCHOOL**
1315 Michigan Ave., Dept. 2297, Chicago, U.S.A.

**TINT! TONE!** Photographic Prints. Black and White Movie Films. Titles, Slides, Prints.
*Dip once and it's done!*
Write for Literature

**Teitel Laboratories** P. O. BOX 123 CORONA, N. Y.

**We Won't Do $1 Developing**

Fine developing and printing can't be done at Bargain prices. Perhaps your best negative is on your present roll . . . but unless it is expertly developed and printed you'll never know. Edwards individually develops, hardens and vaporates every film. Each print is separately made by hand, with full consideration of negative characteristics. Edwards' service is unequaled and reasonably priced. Write today for FREE mailing bags and prices.

**EDWARDS FINE GRAIN LABORATORY**
**30 E. Adams St., Dept. P., Chicago, Ill.**

**NOTICE: TO ALL OWNERS OF LEICA, CONTAX, ARGUS (C-2 & C-3) and KODAK EKTRA Cameras!**

For new pleasures in all types of photography, especially around the home, **INVESTIGATE SPEED-O-COPY TODAY!**

**WRITE FOR FREE FOLDER to:**
**— — D. PAUL SHULL — —**
240 S. UNION AVE. (Dept. P-10) LOS ANGELES

this initial print is to find that you have not placed the cardboard just right in printing the second negative. This is easily corrected on the two remaining sheets of exposed paper which you have left to work with. Just be careful, don't be nervous, and the next two exposures will bring you yelling out of your darkroom to win the praise of your wife or sweetheart, the plaudits of the neighbors, and the envy of your amateur friend who lives in the next block.

It's surprising how time flies, isn't it? You'll find that you've spent about an hour and a half perfecting this composite technique, but the second and third tries will cut the time almost in half. As you progress and master this process, your mind will be taken up less and less with technical details, and you'll find yourself looking for shots to print this way.

They can be sentimental, humorous, symbolic, serious or a mixture of any of these qualities. Children, for example, are excellent subjects for this treatment because their expressions are so natural and so varied. Human interest, sex appeal, seasonal subjects, and vacation scenes should not be overlooked in your search for original combinations. Just remember, the secret of composite printing is the selection of pairs of negatives which have the same contrast and an idea to bind them together.

By this time, you probably have a few questions about this composite business. You may ask, "What good are these composites anyway?" and "Do I have to go through this process every time I want to make a print of some particularly fine composite?" Double-printed combinations have a wide variety of uses, chief of which should be your Christmas cards, birthday cards, party and anniversary announcements, and of course for decoration in your den. A series of extremely well-done composites will supply excellent material for a talk about them at your local camera club meeting. If you've produced a composite from two negatives which possess general community interest, the editor of your local newspaper might give it a play.

It will *not* be necessary for you to go through the involved technique of producing duplicates of your most outstanding composites. This, of course, assumes that you have graduated to the larger paper—8x10 is big enough—and that you have mastered the technique. Just make copy negatives of your best double-prints, using your own camera. Use fine-grain film for this, and light them carefully so that the mounted print won't pick up reflections from your lights. Once you have a good copy negative of your favorite composite, you can make prints of it with no trouble at all.

Run through your negative file and see what pairs you can dig up for making composites. You may locate some fine ones right away. There are sure to be plenty of single pictures which will make good composites with the addition of other shots made specially for the purpose. Then rig up a vignetter and go to work. You can master the technique quickly, and turn out passable prints at your very first session.—

**Recapture The NATURAL COLOR of Your Vacation Pictures**

*It's Easy..*

**THE ROEHRIG WAY!**

With Roehrig True Toned colors, you add a sparkling natural beauty to your favorite black and white pictures . . . for lifetime remembrance of that vacation beauty spot . . . just as you snapped it.

You don't have to be an artist. Just lay in the rich natural colors in a method created especially for Amateur and Professional Photographers. No fuss! No mess! Alter at will 'til you get just the right effect.

**WRITE FOR FREE DESCRIPTIVE FOLDER**

Roehrig Oil Photo Colors are sold in complete sets or single tubes. Write for Free descriptive folder which shows you how easy you can attractively color your favorite photos . . . or ask your dealer.

DEPT. P
**ROEHRIG-BIELENBERG COMPANY**
39 Henry St., Brooklyn, N. Y

**ROEHRIG FOR TRUE COLOR—SINCE 1912**

**Amfiles FOR REELS**

**A FINE GIFT FOR A FRIEND OR YOURSELF**

Bookshelf size for reels or cans. Blue, green, maroon or black.

No. 600 for nine 200-ft. 8 mm reels.....$1.50
No. 700 for seven 400-ft. 16 mm reels..... 1.95

At Stores or direct prepaid on Money-Back Trial. Free Catalog of Amfiles for Slides, Negatives, etc.

**AMBERG FILE & INDEX CO.** 1667 Duane Blvd. Kankakee, Illinois

**THE WIDEST CHOICE OF FINE GRAIN FINISHING**

11 Different Services for 35mm Films from 60c up
14 Different Services for Roll Films from 40c up

OUR SPECIAL OFFER: A complete Contact Strip for reordering and Filing with any of our 35mm services for only ..... 25c EXTRA

**AMATEUR FOTO GRAPHIC SERVICES, Inc.**
130 W. 46th St., N.Y.C. Dept. P. LO. 5-5483

**GUARANTEED 35mm FILM**

ALL FILMS—
Super X, Pan X, Super XX, Panatomic X, Infra-Red
Supreme, Finopan, Ultra Speed, Superior 1, 2, 3

27½ Ft. $1.25

100 FT.—$4.00

RELOADED CARTRIDGES—36 exp. all types—3 for $1.25

Bulk Winder, $1.98. Mail Orders promptly filled. Postpaid or C.O.D.

*Let us quote all your camera needs. Highest prices paid on used cameras.*
Miniature Film Supply Co., 723 Seventh Ave., N.Y.C.

RATES: 30c per word Minimum 10 words

# Classified Advertising

## CAMERAS AND EQUIPMENT TO SELL

ALL Like New, 2 years guaranteed: Baby Bessa, f 3.5, $29.50; Robot, Zeiss, Tessar f 2.8, $69; Leica G, f 2, $149; Original Leitz Everready-Case $5; Ciroflex, f 3.5, $35; Contaflex, f 1.5, $209; Triotar f 4, 85 MM, $85; Cine-Kodak 8MM Magazine, f 1.9, $89. Many others. Trades accepted. Highest Cash-Prices paid for your equipment. Free estimate. American Camera Exchange, 2130 Broadway, New York.

FOR Sale: Condition new, equipment for Contax Camera, American markings, Registered. Zeiss Triotar f 4, 8.5 cm, $102; Zeiss Biogon f 2.8, 3.5 cm, $159; Contameter for Contax III for Sonnars, $72; Micromoter Focusing Slide, $24; Polarizing Viewing Device with 42 mm Bernotar Filter, $53.50; Folding finder van Alabada, Contax III 50 mm, $8.40. G. A. Betts, 588 Monroe Street, Buffalo, N. Y.

SPEED Graphic 4x5—Brand new 7½" f 3.5 Laack Anastigmat, $95. Harold Greene, West Hanover, Mass.

KORELLE I Xenar 2:8 Case. Mechanically perfect. Like new, $65. H. E. Gruhn, 14213 Strathmore Avenue, East Cleveland, Ohio.

AUTO-GRAFLEX. 3¼x4¼ without lens, perfect, $65. Zeiss Tessar 10 inch, f 4.5 focusing mount, lens shade, like new, $110; Zeiss Tessar 6.5 inch f 4.5 extension tube fitting Exakta, best condition, $75; Frank Hornig, 11 Rolling Street, Lynbrook, L. I., N. Y.

MINIATURE Speed Graphic C. R., 3.5 Tessar. H. M. Finder, accessories. $150.00. Mr. Jankovsky, 70 Calvet Place, Bridgeport, Conn.

6.5 x 9 Devin Color Camera, 2 sets Precision Plate holders. Focusing panel carry case. Excellent condition. Must sacrifice immediately, $200. Joseph McLaughlin, 453 Westcott, Syracuse, N. Y.

AUTOMATIC Rolleiflex, Case, Accessories, $200; Recomar No. 33, Case, $50. Other cameras, darkroom equipment, etc. James, 315 Fifth, Elyria, Ohio.

USED One Day Only: Bantam Special f 2 Ektar, sunshade, filters, 30 rolls film, $125. Cost $140. 1327 Missouri Avenue, Chickasha, Okla.

BRAND New: F and R Reporter 2¼ x 3¼ 4" Zeiss lens, tripod, panhead, $85. Cost $150. 1327 Missouri Avenue, Chickasha, Okla.

FOR Sale: Kodak Ektra F1.9, Leica G f 2, Lenses, accessories, meter, slide projector, 3601 Milton, Dallas, Tex.

NATIONAL Graflex II and accessories, $65. Bill Mitchell, 803 21st St., Columbus, Ga.

DEVRY 16 mm sound, 12" speaker, $268. Take 8 mm outfit part payment. Robert S. Mix, South Williamsport, Pa.

SEVERAL choice lenses six to thirteen inches. Send stamp for list. G. Muller, Franklin Institute, Philadelphia, Pa.

3¼x4¼ SPEED Graphic, fully equipped, fine condition. Sale or exchange for Contax II. Nelson, 164-12 110th Road, Jamaica, N. Y.

BELLOWS for all types Foreign or Domestic Cameras, Enlargers. Also built to specifications. New York Bellows Co., 121-P Fulton St., New York.

EXAKTA Model B with Biotar F:2 85 mm Telephoto extension, cable release, Close-up extension. Wide-angle Tessar F:8 55 mm. Accessories: sunshades, leather case, carrying strap, focusing hood, filter holder, exposure meter (Photoscope), bakelite tank, monel metal tank, table tripod, long tripod, both with universal heads. Dr. A. Peterson, Devitt's Camp, Allenwood, Pa.

SERIES B 3¼x4¼ Graflex Lens Kodak Anastigmat 5½" f 4.5. Good condition, $55. R. T. Roush, Angola, Ind.

B & L PROTARS "C" set $85, 3¼x4¼ Speed Graphic, $55. Will swap? Saron, 844 East 13th St., Brooklyn, N. Y.

COLOR Camera, Curtis Scout, 2¼x3¼ W/ Goerz-Dogmar, Film pack holders, 12-cut film holders, C.R.F. case, etc. Cost over $400, sell $295. T. D. Sharples, 220 Orange Grove Avenue, S. Pasadena, Calif.

ROLLEIFLEX, Standard, F3.5 Flashgun, filters, sunshades, bantam adapter, other accessories. Stamp please. Sydney H. Solomon, 18 Metropolitan Oval, Parkchester, Bronx, N. Y.

LINHOF Technika II, 2¼x3¼ 12 cm. f 4.5 Tessar; 16 cm. f 5.5 Tele-Xenar; Kalart coupled range finder; removable back; Kalart flashgun, excellent condition. Send best cash offer to Donald D. Sullivan, 1303 Orchard Road, Reading, Pa.

35 mm f 6.3 Memo Camera and SVE Projector 'K', both single frame. Best offer takes. F. Wallace Taber, 2480 16th St., N. W., Washington, D. C.

RESIDENCE Portrait Studio-Owner drafted, equipment. Inventory $5,000. Five years gross, $47,000. Terms $2,500. Thompson Photographers, Cedar Rapids, Iowa.

EXCELLENT perfex 55, 3.5 Wollenak; case $35. Elwood AM enlarger, $15. Good. Thornton, Somerville, Ohio.

AUTOMATIC Rolleiflex 6x6 complete with filters, sunshade, flashgun in new condition. Will sell for $200. No trades. H. B. VanDyne, 520½ south 9th St., Cambridge, Ohio.

EKTRA F1.9, Extras; cine special F1.9 Extras; B&H 70 D. A.; Leicas, Contax, Contaflex, Zeiss Binoculars, Lenses, Projectors. Will trade. Wells-Smith, 75 E. Adams, Chicago.

AUTO-ROLLEIFLEX, 2 Zeiss filters, Sunshade all like new, $175. C. Woerner, 25 Pierson Road, Maplewood, N. J.

2¼x3¼ RANGEFINDER Weltur, chrome, f 4.5 Tessar $72. Camera bought. Chas. Wolfe, 167 Canal Street, New York. Ca 6-0782.

CINE Special—new model—f 1.5, f 2.7, f 3.5. 2" Adapters, masks, $500. Box 110, POPULAR PHOTOGRAPHY.

ZEISS Nettar A f 4.5, Federal 505, range finder excellent $30. Want reflex, film pack, Argus. Box 113, c/o POPULAR PHOTOGRAPHY.

MINIATURE Speed Graphic; practically brand new. Weston meter. Abbey synchronizer for Super Ikonta B. Box 266, Rock Island, Ill.

2¼x3¼ BeeBee, 3.5 Xenar, Kalart rangefinder, $65; 35 mm enlarger, 5.6 lens, easel base, $20. Box 424, St. Joseph, Mo.

## CAMERAS AND EQUIPMENT WANTED

WANTED: Miniature speed graphic 2¼x3¼. Leo Allinger, 2577 Manchester Rd., Akron, Ohio.

CASH! Spot cash for camera, lenses, binoculars, movie or still, sound projectors. Send full description by mail, or Wire for prompt cash offer. Over 30 years of dependability insures honorable dealings. Bass Camera Company, 179 West Madison Street, Chicago, Illinois.

LEICA 35, 90 or 135 mm lens, like new. Howard Gillespie, Oxford, Ind.

HIGHEST Prices for used Cameras, Equipment, any Optical merchandise. Satisfaction guaranteed. Gordon's, 162-P Madison, Chicago.

WANTED—Used Weston Master, Model 715, Exposure meter. R. Cameron Hyatt, Washington, Ind.

WANTED: 16 mm Filmo D. A. Camera in perfect condition. George Lathrop, Bristol, Vermont.

CASH: We buy cameras, projectors, lenses, binoculars, microscopes, etc. Highest prices paid. (We also accept the above plus musical instruments, guns, etc., toward cameras). For quick action write or ship to George Levine and Sons, Dept. C., 15 Cornhill, Boston, Mass. (Estab. 1896).

WANTED, used Pako Electrogloss dryer, or one similar (glossy prints). Burton Miner, Gouverneur, New York.

WANTED—Candid Falcon f 4.5 and case. J. H. Gough, 69 Exchange Street, Lynn, Mass.

WE will pay cash, or give liberal allowance for good cameras, lenses, binoculars, microscopes, firearms, astronomical telescopes toward purchase of anything photographic—movie or still. Describe fully what you have and want. Established 1914. National Camera Exchange, 11 So. 5th St., Minneapolis, Minn.

SEND us your camera today. Will send certified check by airmail immediately. Items held 10 days for your approval of our price. Free estimates—Trade-ins. Highest prices in the U. S. for photo equipment. "Cleveland's Camera Super-Market." Rotbart and Reitman, 1900 East 9th St., Cleveland, O.

WANTED: Auto Rolleiflexes or similar. Cory Snow, 755 Boylston St., Boston, Mass.

PAWNBROKERS since 1858 specializing loans on cameras. H. Stern, 872 Sixth Avenue, New York.

**SPECIAL RATES FOR READERS**

Non-commercial readers who wish to buy, sell, or exchange cameras or equipment are invited to take advantage of our SPECIAL rates in this section. 15 words for $1.50. Extra words 25c each. Payable in advance.

USED Darkroom Equipment, cameras bought, sold, traded. New Kodaks in stock. Universal Camera Exchange, 128-p Chambers Street, New York City.

ROLLEIFLEX or Rolleicord wanted. Cash for best offer. Earle Wilder, High School, Gloucester, Mass.

WANTED: Zeiss Ideal, Juwel, or Linhof; preferably 9x12 cm. Also Ikoflex or Rolleiflex. Box 266. Rock Island, Ill.

WANTED: 90 mm. Leica lens, with finder, or will trade Busch 8x30 Prism Binoculars. Box 1202, Shreveport, Louisiana.

WANTED: Leica G or F with f 2 or faster lens. Priv. party. Box 111, c/o POPULAR PHOTOGRAPHY.

## HELP WANTED

SALESMEN and Jobbers: Complete new line photo frames and folders. Following among photo supply houses, dept. stores, etc. Mention territory. Weinman Brothers, 325 N. Wells St., Chicago.

## INSTRUCTION

MAKE money in photography. Learn quickly at home. Easy plan. Previous experience unnecessary. Common school education sufficient. Booklet and requirements free. American School of Photography, 1315 Michigan, Dept. 2252, Chicago.

DRAFTING and Mathematics courses. Each $1 complete! Inquire Giles, Dept. A-5, 1326 Myers, Burbank, Calif.

FINGER Print Experts earn big pay! Learn Easily at Home. Low Cost! "Crime Book" Free. Write stating age. Dept. 27, Inst. Applied Science, 1920 Sunnyside, Chicago.

OIL coloring photographs a fascinating hobby or profitable business. Learn at home. Easy simplified method. Previous experience unnecessary. Send for free information and requirements. National Art School, 1315 Michigan, Dept. 2256, Chicago.

CORRESPONDENCE Courses and educational books, slightly used. Sold, Rented, Exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete details and bargain catalog free. Write Nelson Company, 500 Sherman, Dept. K-237, Chicago.

## MISCELLANEOUS

FOR sale, well stocked Camera shop and Finishing plant. Doing good business. Fine location. Archer Camera Shop. Titusville, Pa.

ADVANCED Amateurs, Attention! Improve your technique and get more fun out of your hobby. Read American Photography every month, the magazine for both technicians and pictorialists. Send today for a sample copy and a sample of our 40-page book catalog, enclosing ten cents for postage. Camera House, 122-153 Newbury St., Boston, Massachusetts.

OUTDATED Magazines, Catalog 10c. Cicerone's, 863 First Avenue, New York, New York.

BINOCULAR wanted—Six, seven or eight power Bausch & Lomb or Carl Zeiss lightweight center focusing. Will pay top price for fine binocular. M. A. Hogan, 201 South Main St., Ann Arbor, Mich.

100 JEWELRY Stones removed from rings, etc. $2.00. Lowe's, Box 311, St. Louis, Mo.

THE Photographic Series of the Little Technical Library will guide you through every phase of photography. Each of the 30 pocket-size text books is complete in itself, authoritative, profusely illustrated, authored by noted photographers. On sale at all leading camera, department and book stores. See page 14 for complete list of titles.

SELL your pictures through this new commission agency for more sales, larger checks. Postcard brings details. Photo-Marketers, Box 110, Southbridge, Mass.

## MOVIE FILMS Rented—Sold—Exchanged

HAVE considerable footage in original 16 mm Kodachrome of Niagara Falls, and its companion attractions. Originally scheduled for travelogue. Filmed 1942, 18c per foot; $1.00 minimum. Stuart V. Jewell, 7223 Pine Ave., Niagara Falls, N. Y.

## PHOTO FINISHING

8x10 ENLARGEMENTS 25c @ 5 for $1.00 any roll developed printed and 5x7 enlargement 25c payment in defense stamps. Paramount Photos, Slatington, Penn.

POPULAR size film finegrain developed and enlarged 3½x5, 25c. Send for mailing bag. Master Photo Labs, 2612 Avenue I, Brooklyn, N. Y.

## CAMERA REPAIRS

PRECISION Repairs, Shutters, Lenses, Rangefinders, Synchronizers, Binoculars, Accuracy guaranteed. Camera Craftsmen, 15 West 44th St., N. Y. C.

EXPERT Camera Repairs: Foreign—Domestic—Movie—Still. Bellows made to order. Projectors. Camera Repair Shop, 30 E. Adams St., Chicago, Ill.

CAMERAS, shutters, rangefinders, lenses (specializing all foreign makes). Twenty-four years experience. Midtown Optical & Camera Service Co., 1192 Sixth Ave., New York City, N. Y., Longacre 3-3764.

EXPERT repairing of all Compur and Compound shutters by the U. S. Manufacturer Representative. Hans Unfried, 71 E. Genesee, Buffalo, N. Y.

## MOVIE EQUIPMENT

16 MM FILMS EXCHANGED, 400 ft. reel Silent, $1.00; Sound, $2.00. Latest releases. Free 40-page catalogue. Better Films, 742 New Lots Avenue, Brooklyn, N. Y.

## SWAP

TRADE Precisa camera, 2.9 lens, powerful telescope, radio. Wanted high power binoculars. Write Hudson Bicknell, Marbury, Maryland.

MARTIN Alto Sax, excellent. For 4½" lens compur. John Finch, 95 North Broad. Penns Grove, N. J.

WANTED: Revolvers, target pistols, shotguns, rifles, binoculars. We make liberal allowances for firearms and binoculars to apply toward the purchase of 16 mm and 8 mm movie equipment, still cameras, enlargers and photographic equipment of all kinds. National Camera Exchange, Established in 1914, 11 So. Fifth St., Minneapolis, Minn.

SELL, swap for camera, separately, together, volumes 1-9 POPULAR PHOTOGRAPHY, $88 New York Institute Photography course. J. Baron Marino, 165 Hicks Street, Brooklyn, N. Y.

SWAP 23 jewel (21 sapphires 2 diamond) 16 size Waltham watch; guaranteed like new; for Graflex or reflex camera. Ralph W. Tiede, Mt. Vernon. Mo.

$89 CREDIT on any I.C.S. course. Want camera or (?). Box 112, c/o POPULAR PHOTOGRAPHY.

COCKER spaniel puppies for photoelectric light meter, camera or photographic equipment. Box 234, Wheelwright, Ky.

**NOTICE!**

In replying to Box Numbers, be sure to address letters to

**POPULAR PHOTOGRAPHY**
**540 North Michigan Avenue**
**Chicago, Illinois**

Note! This does not apply to Box numbers where City and State are shown.


**35mm Films NO SCRATCH | Developed and Enlarged ULTRA FINE GRAIN**

**Inspection Development Only Insures Balanced Negative Quality**

Enclose money with your roll and send to us. You will get with each good exposure one enlargement, 2¾ x 4¼, all guaranteed. 35mm. film developed for strip printing 25c. Strip prints, two exposures per strip, 4c each. 8 exposure rolls developed for 20c, ultra fine grain, contact prints 7c each. Beautiful 5x7 enlargement from 8 exposure rolls 25c each. Send for free mailing bags.

**36 EXP. $1.25**

**18 EXP. $1.00**

**MITCHELL STUDIOS, INC.**
**Box 1976, Cleveland, Ohio**


# INDEX OF Advertisers OCT. 1942


| COMPANY | PAGE NO. |
|---|---|
| Ace Art Co | 75 |
| Acme Ferrotype Co | 98 |
| Agfa Ansco Corp | Second Cover |
| Amateur Foto Graphic Serv | 99 |
| Amberg File and Index | 99 |
| American Bolex Co | 79 |
| American School of Photography | 88 |
| American Studios | 65 |
| Aremac Camera Co | 82 |
| Argus, Incorporated | 61 |
| Art Slide Co | 84 |
| Bass Camera Co | 65 |
| Bell & Howell Company | 17 |
| Bell's Photo Lab | 96 |
| Best Photo Serv | 97 |
| Beta Photo Labs | 78 |
| Better Pictures | 97 |
| Broadway Negative Service | 92 |
| Burke & James, Inc | 15 |
| Camera Mart, Inc | 98 |
| Camera Technicians | 97 |
| Capital Camera Exchange | 95 |
| Capitol Negatives | 96 |
| Castle Films | 5 |
| Central Camera Co | 90 |
| Cine Art | 98 |
| Ciro, Inc | 80 |
| Classified Section | 100 |
| Cohen's Exchange, Abe | 79 |
| Color-Full Laboratories | 84 |
| Color Prints, Inc | 98 |
| Cosmopolitan Films | 96 |
| Craftsmen's Guild | 98 |
| Craig Movie Supply Co | 64 |
| Defender Photo Supply Co., Inc | 3 |
| De Jur Amsco Corp | 77 |
| Developix | 78 |
| Drake, The | 80 |
| Eastman Kodak Co | 68-69 |
| Edmund Salvage | 96 |
| Edwal Laboratories, Inc. (The) | 102 |
| Edwards Fine Grain Labs | 99 |
| Electronic Products Mfg. Corp | 96 |
| Emby Products Co | 88 |
| Engel Art Corners Mfg. Co | 97 |
| Excel Photos | 99 |
| Federal Mfg. & Eng. Corp | 81 |
| Film Center Reloading Serv | 94 |
| Fine Grain Photo Labs | 96 |
| Fink Roselieve | Back Cover |
| Folmer Graflex Corporation | 59 |
| Fotoshop, Inc | 62-64-95 |
| Free Lance Photographers Guild | 94 |
| Fromader-Genera Co | 64 |
| Ganz Co., A. J | 85 |
| General Electric Co | 11-76 |
| General Loose Leaf | 93 |
| Ghost Town "Pitcher Gallery" | 94 |
| Graphomay | 84 |
| Haber & Fink, Inc | 81 |
| Haloid Co., The | 66 |
| Hampden Sales | 95 |
| Henry Herbert | 93 |
| Hollywood Film Enterprises | 92 |
| Hollywood Negative Service | 95 |
| Hollywood Transparency Company | 98 |
| Household Finance Corp | 97 |
| Hub Mail Film Service | 95 |
| Kalart Co. Inc. (The) | 10 |
| Kaufman & Fabry Co | 85 |
| Kin-o-Lux | 91 |
| Lafayette Camera | 96 |
| Levine & Sons, Geo | 87 |
| Little Technical Library | 14 |
| Lotock Cameras, Inc | 98 |
| Luray Caverns | 96 |
| Lutz, A | 97 |
| Mail-bag Film Service | 86 |
| Marshall, Inc., John G | 94 |
| Hugo Meyer & Co | 97 |
| Midget Radio Co | 98 |
| Miles Co., E. E | 74 |
| Miniature Film Supply Co | 99 |
| Minicam Photo Labs | 97 |
| Minilabs | 88 |
| Minipix Labs | 99 |
| Mitchell Studios, Inc | 101 |
| Model Film Co | 90 |
| Modern Photo Labs | 90 |
| Modern Products Co | 86 |
| Montgomery Ward | 75-97 |
| Mortensen School of Photography | 85 |
| National Art School | 99 |
| National Educational Alliance, Inc | 9 |
| National Film Co | 98 |
| Negafile Co | 90 |
| New York Camera Exchange | 96 |
| New York Institute of Photography | 7 |
| Northsul Co | 87 |
| Novex Corp | 83 |
| Official Films | 65 |
| Olden Camera & Lens Co | 89 |
| Pacific Coast Film Co | 97 |
| Peerless Camera Stores | 8 |
| Penn Camera Exchange | 6 |
| Phaostron Co | 74 |
| Photo-Electro | 98 |
| Photo Lab., Inc | 96 |
| Postal Telegraph & Cable | 82 |
| Powell's Camera Mart | 78 |
| Projection Slide Co | 98 |
| Rabson | 91 |
| Radio City Negative Co | 99 |
| Ray's Photo Service | 95 |
| Ray Schools (The) | 86 |
| Revere Camera Company | 13 |
| Rosicrucians | 86 |
| Roehrig-Bielenberg | 99 |
| School of Modern Photography (The) | 72-73 |
| Shull, D. Paul | 99 |
| Smith & Sons Corp., J. H | 88 |
| Spiratone Fine Grain Labs | 94 |
| Standard Fine Grain Services | 98 |
| Studio 35 | 82 |
| Superior Bulk Film Co | 84 |
| Tamms Silica Co | 98 |
| Tasopé | 98 |
| Technifinish Lab | 92 |
| Teitial Labs | 99 |
| 35 MM Film Exch | 96 |
| United Camera Co., Inc | 98 |
| United Camera Exchange | 92 |
| U. S. Photo Service | 85 |
| Universal Photographers, Inc | 97 |
| Universal Photo Serv | 95 |
| Vaporate Co., Inc | 98 |
| Wabash Photolamp Corp | 63 |
| Walter Labs | 94 |
| Westinghouse | 71 |
| Weston Electrical Instrument Corp | 75 |
| Westphalen, Leonard | 89 |
| Wholesale Photo Supply Co | 90 |
| Willoughbys | 12 |
| Wollensak Optical Co | Third Cover |
| Zeiss Inc., Carl | 77 |

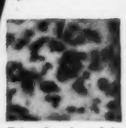

**While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.**

# Send for this TRIAL OFFER

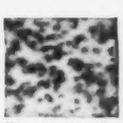
PINT SIZE
**EDWAL-20**
*Ultra Fine Grain Developer*
*Plus* PINT SIZE
**HIGH ENERGY REPLENISHER**
BOTH *for* **50¢** *only*
POSTPAID

700 dia. photomicrographs of:

Film developed in Borax developer.



Film developed in EDWAL-12.



Film developed in EDWAL-20.

## *Get the* BEST NEGATIVES *You've Ever Had!*

YOUR *only chance* to try this old reliable, super-fine-grain developer at this low price! Never offered before—perhaps never again! Make YOUR negatives yield BIG prints of surpassingly fine quality, like those of leading pictorialists who also use Edwal-20.

**SOLVES DEVELOPING PROBLEMS**

Use Edwal-20 and its Replenisher, as instructed, and your pictures will be as excellent as your camera will permit. All your negatives will be uniform, with no blocked-up highlights or muddy shadows. Enlarging will be more fun. Salons and contests will interest you. Your friends will admire your work. You'll "go places" with your hobby! Save money—avoid fruitless experiments and expensive, short-lived developers. Develop your films in Edwal-20 replenished with Edwal-20 High Energy Replenisher if you want first-class, finest-grain negatives every time.

**DON'T DELAY—OFFER ENDS NOV. 1, 1942**

Limited quantities of these packages means "first come, first served." This is strictly a trial offer available only from us. (Dealers have quart sizes at 85c each.) Fill out the coupon and mail it NOW with 50c money order or stamps, *the only way to get these valuable trial packages.*

## THE ULTIMATE *in Fine Grain Developers*

1. **Uniform Negatives** of finest grain structure, from first to last roll! Enlarge from 25 to 60 diameters or more!
2. **No Uncertainty** about developing times at temperatures from 65° to 90° F.
3. **Permits Normal Exposures** of all miniature films. This is a valuable advantage.
4. **Highest Print Quality** with all detail retained in highlights and shadows. No "blocking-up", no hindering fog.
5. **Easy to Use.** Complete instructions cover processing of all films available.
6. **Low Cost.** Trial quantities will develop upwards of 14 rolls of 35mm film at a cost of 3½c each (50 rolls of Bantam film at 1c each) when instructions are followed.

THE EDWAL LABORATORIES, Inc.
Dept. 10PP, 732 Federal Street, Chicago, Ill.

For the enclosed 50c (money order or stamps) send me postpaid one each pint-size Edwal-20 and Edwal-20 High Energy Replenisher with complete instructions for use. Also include Bulletin 14A describing other Edwal products and put my name on your list to receive Laboratory Bulletins and advance information on new products, processes, etc.

I ☐ now use ☐ do not use Edwal-20.

I ☐ now use ☐ do not use Edwal-20 High Energy Replenisher.

NAME.....

ADDRESS.....

CITY.....STATE.....

**FOR BEST RESULTS *Do Your Own* DEVELOPING.. *with* EDWAL**

PRINTED IN U. S. A.

942

dia.
micro-
hs of:

eloped
devel-

ped in

ped in

*ss*

rom
's or

tem-

lms.

d in
no

oces-

ds of
rolls
are

S. A.

# HOME-BUILT PHOTO EQUIPMENT

A POPULAR PHOTOGRAPHY DIVIDEND

## by WALTER E. BURTON

LENS ACCESSORIES
STURDY TRIPOD
PAN-TILT HEAD
REMOTE TRIPPER
LENS SHADES
LENS CAPS
PINHOLE LENSES
SPOTLIGHT
FLOODLIGHT
LAMP STANDS
LIGHT-CONTROL SWITCH
REFLECTORS
BACKGROUNDS
CONTACT PRINTER
ENLARGERS
ENLARGING METER
FOOT SWITCHES
PAPER EASELS
PAPER SAFE
DODGING DEVICES
SAFELIGHT LAMP
FILM DRYER
PRINT TRIMMER
TANK AGITATOR
OVERSIZE TRAYS
MASK CUTTER
ABOUT TOOLS, ETC.

### INTRODUCTION.

PHOTOGRAPHY is a hobby with many facets—landscape, portraiture, still life, and so on. But in addition to straight picture taking, there might be listed other phases such as darkroom experimenting, camera trading, and gadget building.

The construction of photographic equipment is one of the most fascinating branches of the avocation. In fact, it amounts to a hobby in itself. It enables the camera owner to acquire many pieces of equipment that cannot be bought at any price —specialized gadgets to fit his own particular needs. It saves him money, too, for he can build items at a fraction of what a manufactured counterpart would cost.

This doesn't harm the manufacturer; actually it boosts his business. Chances are that the man who takes the time to build an accessory wouldn't have bought one ready-made anyway; but after his interest is aroused, he might buy the next one, or influence his friends to do so. More than one manufacturer has some gadget builder to thank for a product idea or improvement.

But where is the amateur photographer going to get his ideas and help in making photo equipment? This article is an apt answer. It covers the major items of equipment necessary or desirable to a successful pursuit of the hobby of photography. Its projects are simple enough to be duplicated by anyone at all handy with tools. There are some more intricate gadgets for the craftsman who cannot get interested unless it looks complicated. However, even the "complicated" projects are basically simple, and can be duplicated in simplified form and with ordinary tools by anyone.

Much time and trouble can be saved by selecting materials easy to use. Wood is one of the easiest raw materials to cut, form, and finish. The extremely hard woods, such as maple, will serve, in many instances, instead of metal. They should not be substituted where heat is a factor. Empty tin cans can be used in so many ways that they form a major supply item. Tinplate is easy to solder, easy to bend, and easy to cut. Steel in sheet form can be used for many parts, but its chief drawback is that it corrodes easily under average darkroom conditions. Brass is much better, and is the ideal material when it can be obtained, and when its weight is not objectionable. Aluminum is useful, too, but cannot be soldered easily. Small bolts, wood screws, hinges, and other odd parts can be purchased at almost any store selling hardware.

Success in working any material depends on the tools available. You can reproduce most of the projects contained in this book with nothing more than the average workbench equipment—hammer, screwdriver, pliers, flat and triangular files, some abrasive cloth, tinner's snips, electric soldering iron, hand drill and assortment of bits for metal, brace and bits for wood, a small punch for making holes in thin metal and starting holes for drills (an old ice pick will do), small hack saw; if possible, a jeweler's saw with some medium-fine blades for shaping delicate parts in metal; a few wood chisels of various widths. If you have access to power-driven tools, so much the better. Keep all cutting edges sharp, and you will save yourself a lot of grief.

If you are inexperienced in building things, follow plans

closely. The more accomplished craftsman can use the plans as general guides, and work out his own details. But whichever the method, remember that neatness is the mark of a good workman. A good-looking, well-built gadget is easier to use and more satisfactory. A little extra time spent in producing an attractive finish will be repaid by the increased number of "oh's" and "ah's" from admiring friends.

When you encounter some bit of sheet-metal work, electrical wiring, cutting of steel, or any other task that you feel is beyond your present abilities, you can find some local craftsman who will gladly help you for a moderate fee. Instances will arise where you can swap some pictures for services of this kind. Radio repairmen are especially fitted to give assistance with problems of wiring, and can supply such parts as dials, bakelite, switches, old cabinets, and other items which you might require.

If you do your own electrical work, keep safety uppermost in mind. Use only standard, approved sockets, switches, fuses, etc. Be careful that no part of an electrical circuit comes in contact with a metal housing or other metal part that you might touch while using the gadget. It is dangerous to touch any electrically charged object while standing on a damp floor or working around a sink. Be sure all connections are securely soldered or clamped and properly insulated. For wire splices, use rubber tape followed by a layer of friction tape, to cover the bare joint and a portion of insulation for a short distance on each side of it. Wood can be used as an insulating material in some cases, as in the foot switch described. However, if you can obtain a plastic or fiber material that is more resistant to burning, use it instead.

It is good practice to ground enlargers and other equipment that might become charged through a short circuit. This consists of running a fairly heavy wire (such as No. 10) from some point on the metal housing to a water pipe (never a gas pipe). Make tight connections. If a short does occur, the electricity will travel to the ground, which it always seeks through the wire instead of through you! Always use fuses of not more than 15 amperes in the line supplying your darkroom. Heavier fuses may be required in lines supplying your lighting units. Detailed information concerning fusing and various other safety precautions can be obtained from a local power company or electrical inspector's office.

There is no limit to the things that photo-gadgeteers build. Some of the devices they turn out are excellent, but require a considerable amount of time and patience. The individual builder should stay within the limits of his ability. At first it is best to tackle the simpler items, and gain some experience before trying the more elaborate accessories. Start out by building what you need to carry on the photographic hobby—the equipment necessary for taking pictures and processing them. Later you can add any "luxury" items you may want.

And now, a final word to new gadget builders. Don't be afraid to try your hand at working with tools you've never used before. A few experiences will familiarize you with them, and with the various building materials, too. Craftsmanship is a lot of fun, and once you've established a "shop," you can expand your field of activity to making many useful gadgets for the home as well as for the darkroom and studio.

## LENS ACCESSORIES.

THE abilities of a camera lens can be extended greatly by the use of auxiliary lenses, diffusion screens, and filters. In enlarging, too, such auxiliaries—particularly diffusion screens and positive supplementary lenses—are often useful.

Since these attachments usually are circular disks, they can be held in front of the lens by a conventional lens cap from which the central portion has been cut. After the disk has been placed inside the cap, use a ring of cardboard or metal to hold it there. The ring can be anchored with cement, or can be of a size that permits it to be pressed tightly into position.

Another way of making a mount that is surprisingly durable is to obtain a round pill box of a diameter slightly greater than that of the lens barrel, and cut a hole in the bottom slightly smaller than the auxiliary lens. Insert the lens, and glue a ring of cardboard around the inside circumference to hold it in place (Fig. 1). Finally, add a layer of velvet to bring the mount to a snug-fitting size. Give the cardboard two coats of lacquer or shellac. Such mounts should be deep enough to permit them to fit well over the camera lens. The distance from the front of the camera lens (glass surface) to the auxiliary filter, lens, or diffusing screen is not particularly important. Usually a separation of ¼ to ½ inch is about right.

**Supplementary Lenses.**

Practical supplementary lenses for shortening or lengthening the focal length of the camera lens can be made from spectacle lenses and other simple lenses. A **positive** (magnifying) lens is used for **shortening** the focal length to permit copying, making photomacrographs, and for increasing the angle of view; and for increasing the magnifying power of an enlarger without moving the easel farther away. A **negative** (reducing) lens is used to **increase** the focal length for making portraits when large images without perspective distortion are desired, and for making telephoto pictures that show distant objects as if they were closer to the camera.

Spectacle lenses are the usual types serving as auxiliaries to camera lenses. Even the cheap varieties used in spectacles selling for a dollar or so produce good results, provided the camera lens is stopped down to *f* 11 or thereabouts. The diameter of the auxiliary lens need not be exactly the same

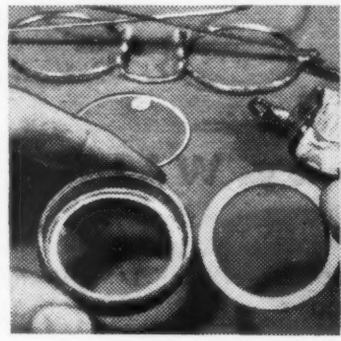


**Fig. 1. Spectacle lens can be mounted in a cardboard holder.**

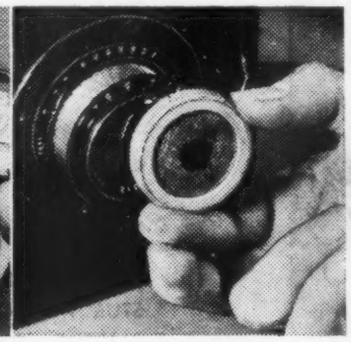


**Fig. 2. A diffusion disk made from piece of fine wire screen.**

as that of the camera lens, but may vary considerably either way. The mount can be arranged accordingly. A common spectacle-lens diameter is 1⅝ inches.

Positive supplementary lenses are used when the camera lens cannot be moved out from the film far enough to permit closeups to be made, or when images life-size or larger are to be produced with a camera having limited bellows extension. When the camera lens is set at the infinity focusing position, an object will be in sharpest focus when placed at the focal distance of the auxiliary lens. When the camera is a focusing type, its lens can be racked out for working at closer range.

The focal length of a spectacle lens is measured in **diopters**. This unit of measurement is equal to the **reciprocal** of the focal length expressed in meters, hence, 1 diopter equals about 40 inches, 2 diopters equal about 20 inches, and so on. For use with a camera set at infinity, the following working distances are obtainable with various spectacle lenses:

| Focus of Spectacle Lens in Diopters | Working Distance (Lens to Object), Camera Focused at Infinity |
|---|---|
| 1 | 40 inches |
| 1¼ | 32 inches |
| 1½ | 26½ inches |
| 1¾ | 23 inches |
| 2 | 20 inches |
| 2½ | 16 inches |
| 3 | 13 inches |
| 4 | 10 inches |
| 5 | 8 inches |
| 6 | 6½ inches |
| 8 | 5 inches |

The distance from the auxiliary lens to the front of the camera lens is not critical: about ¼ to ½ inch generally is convenient. Spectacle lenses are of a meniscus shape, having one convex and one concave surface, and the convex surface should be placed outward.

A positive auxiliary lens increases the marked apertures of a camera lens, while a negative lens decreases them. Thus a lens at *f* 8 may become *f* 6.3 with a positive auxiliary, or *f* 11 with a negative, when focused on a distant object. The exact degree of change can be calculated, but as a rule you can estimate it closely enough. Roughly, you should decrease the exposure when using a positive lens for objects at some distance, and increase it when using the same lens for extreme closeup work. When using a negative supplement, increase the exposure.

**Filters.**

Glass or plastic filter disks, if on hand, can be mounted in suitable holders for attaching to a camera. Much cheaper, though not as durable, are filters made from gelatin sheets you can purchase through a photo-supply dealer. This gelatin, which is affected by water and should not be touched with the fingers, will give long service if handled with reasonable care. It normally costs about 40 cents for a 2-inch square, and it is easily cut to any size or shape with scissors. Any other transparent colored material can be used as a photographic filter provided it is clear enough to permit the lens to form a sharp image.

**Diffusing Attachments.**

Soft-focus effects suitable for portraits and pictorial scenes are produced by diffusing the image either when the negative is being exposed or when a projection print is being made. The diffusing attachment is something placed over the lens to upset its corrections so much that the image is "fuzzed up" or made slightly unsharp. If you use an auxiliary lens of the type described in the section immediately following, you can introduce diffusion simply by opening the camera lens to *f* 4.5 or thereabouts, instead of stopping down to *f* 11 or smaller. This can be done either when taking or enlarging the picture. A common way of diffusing enlargements is to hold a piece of wire screen, preferably fine-mesh, or a tightly-stretched piece of black cotton mesh or silk stocking in front of the lens and close to it. This stunt can be used with a camera when taking a picture. If a wire screen is used, you can mount it in a holder that slips over the lens. A piece of mesh can be sandwiched between glass or stretched in embroidery hoops.

Usually the diffusion with a fine mesh will be too great, and a picture that is too flat, with insufficient gradation in the highlights, will result. To overcome this, punch (or burn) a hole in the center of the diffusion screen (Fig. 2). The best diameter is found by trial. For an *f* 4.5 lens having a 42-millimeter barrel, the hole can be nearly ½ inch in diameter. With such a diffuser, you can regulate sharpness by varying the lens aperture: the smaller the aperture, the less the diffusion.

Some kinds of transparent cellulose film have just enough irregularities in them to produce pleasing diffusion when placed over a camera lens. The best way to judge the effect is, of course, by trial. Cut the film to fit a cap-like holder, or tie it around the lens barrel with a string or rubber band. If the diffusion is too great, cut a hole in the center of the film disk, as in the case of a wire or cloth screen.

## A STURDY TRIPOD AND PAN-TILT TOP.

THE best cure for unsharp still pictures or bouncing movies is a sturdy tripod. The building of such a photographic necessity is not as difficult as you might think. The tripod shown in the illustrations was constructed at a cost of about one dollar for materials, and a pan-tilt head to go with it added less than fifty cents to the bill. Some odds and ends already on hand were used, which naturally lowered the cost.

The tripod has two-section wooden legs of great rigidity. The minimum height from the floor is 30 inches, the maximum height is 53 inches. The adjustable head adds another 1⅞ inches. Weight of the tripod is a shade less than 5 pounds, which puts it in the lightweight class, considering its capacity. The reason for its comparative lightness is that it is made largely of wood.

From ¾-inch or ⅞-inch maple, cut a disk 3 inches in diameter, to form the top. For the time being, forget about the adjustable head, which will be treated later. The top forms the base for the head, but it can be equipped, like any ordinary tripod top, with a ¼-20 bolt or screw having a knurled head, so cameras can be fastened directly to it. However, if you are going to add the pan-tilt head, save the tripod screw for it.

Obtain three medium-weight 5-inch strap hinges. These are about 1¾ inches wide, measured at the pins. Remove the end of each pin with a saw or file, and knock the pin out with a punch, so you can separate the halves. Retain the leaves having the double portions that encircle the pins, and discard the rest. With a hack saw, cut the three leaves to the shapes shown (Fig. 3), and assemble them on one surface (the bottom) of the disk so they project at equidistant points around the circumference and form lugs to which the tripod legs can be attached.

Usually there are two screw holes remaining in each hinge section for fastening it to the disk. If not, drill and countersink new holes. Before mounting the hinges on the disk permanently, give the wood surface a coat or two of brushing lacquer, varnish, or enamel. You can leave the hinge sections in their original finish, and coat them with clear or

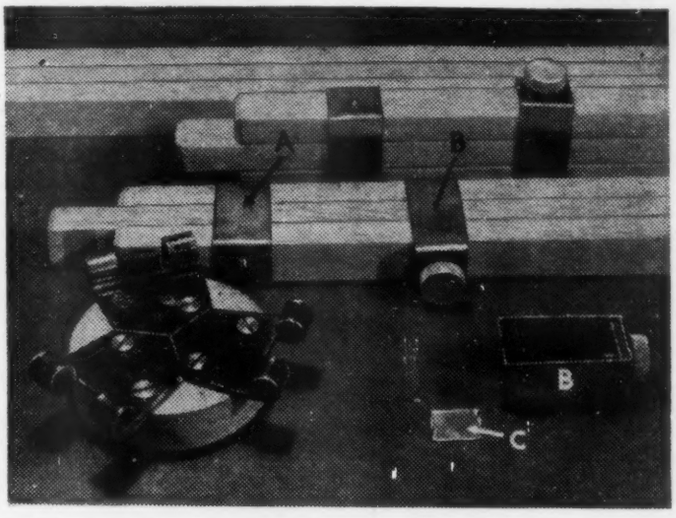



**Fig. 3. Left, tripod top with leg mounts. A, lower leg band; B, upper leg band; C, metal guard placed under locking screw.**

colored lacquer; or you can give them a blued finish like a gun. Inexpensive gun-bluing kits can be obtained from sporting-goods stores. The most convenient ones have two bottles of chemicals. One solution is used to give the iron or steel a coat of copper, and the other is employed to darken the copper. Such treatment, which is excellent for various other iron or steel parts of photographic equipment, improves the appearance and reduces the tendency to rust.

Next construct the tripod legs. Walnut, ash, and oak are among the best woods to use. The model shown has oak legs. From a board ¾ or ⅞ inch thick, saw six strips 9/16 inch wide and 30 inches long, for the outside pieces; and three strips 9/16 inch wide and 29 inches long, for the center or sliding sections. Sand these pieces and round the edges so they won't be objectionably sharp. Bevel the ends slightly (about ⅛ inch) as follows: Outside or upper leg sections, three outside edges of lower ends; center or sliding sections, all four edges of upper ends, and two shorter edges of lower ends.

Determine what diameter bolt will pass through the hinge holes in the top. Usually this will be ¼ inch, the fit being rather loose. At a point equidistant from the upper end and sides of each of the six outside leg sections, bore a hole to receive the bolt. The legs are assembled with the wider surfaces of the various sections in contact, so these holes are 9/16 inch long. It is a good idea to bore them at a slight angle, 2 or 3 degrees from perpendicular, so they will parallel the bolts when the leg sections are sprung out to pass over the ends of the hinges (see Fig. 7, page 107). With a rasp or sanding block, round the upper ends of the outside leg sections to a semicircular form, the bored holes being at the centers of the circles.

Next make the six bands that pass around the tripod legs to hold them together. Use fairly stiff sheet material such as brass, monel metal, or steel treated to retard rusting. Cut this into strips about ⅞ inch wide. The three lower bands are placed about 1½ or 2 inches from the ends of the outer leg sections (Fig. 3A). They should fit rather snugly, being tight enough to prevent lost motion between outer and center leg sections, yet loose enough to permit the center sections to slide easily.

The upper trio of bands extend about ⅛ inch beyond the wood, to permit a locking screw to operate (Fig. 3B). This locking screw is a ¼-20 bolt having a winged or knurled head. Often you can purchase such bolts from hardware stores, or you can use tripod screws obtained from a photo-supply dealer. Still another way is to solder or braze washers or rectangular pieces of metals in the screwdriver slots of short (⅜-inch long) bolts. Each bolt passes through a hole in the end of a band and enters a threaded hole in the center of a rectangular piece of brass or other metal cut to fit snugly inside the band.

Attached to the wood is a small piece of metal against which the end of the bolt presses. This metal piece can be fastened by small nails, or sharp-pointed tongues can be cut near its corners and bent at right angles to form tack-like points that are driven into the wood (Fig. 3C). When you tighten the screw, the rectangular plate or nut moves toward

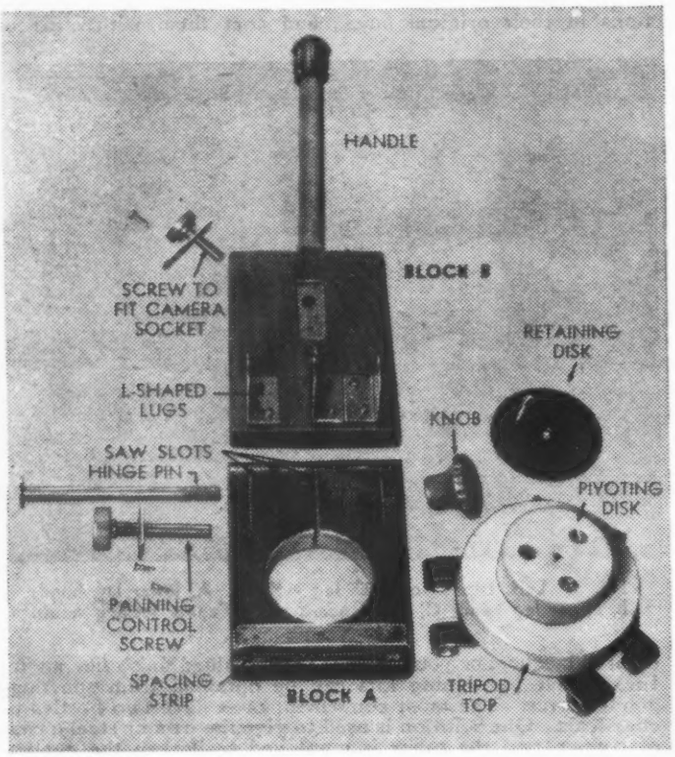



**Fig. 4. Completed parts required for building the adjustable pan-tilt head and tripod top, shown before they are assembled.**

the screw head, and the end of the screw presses against the plate on the wood strip. This action clamps the three sections of the tripod leg tightly together.

The sliding section of each leg is reversible, so that either end may be presented to the floor or ground. For use indoors, one end is provided with a pad that prevents marring of floors and retards slipping on smooth surfaces. Rubber-headed tacks or screws are excellent. If possible, use screws having rubber heads about ½ to ⅝ inches in diameter: portions that project beyond the sides of the leg section may be trimmed. Similar pads can be cut from old rubber heels, etc.,

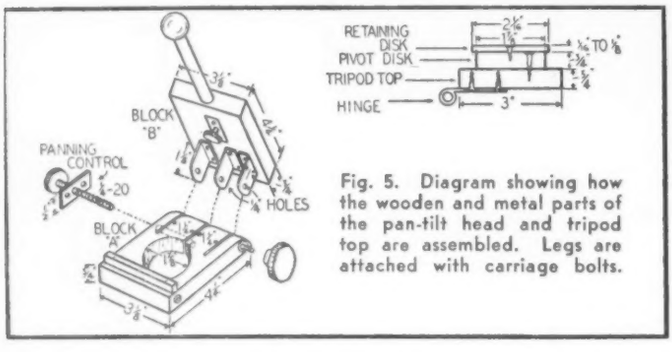



**Fig. 5. Diagram showing how the wooden and metal parts of the pan-tilt head and tripod top are assembled. Legs are attached with carriage bolts.**

and secured with screws whose heads are countersunk so the rubber covers them. If suitable rubber is not obtainable, similar pads may be made of soft leather, felt, etc. The other end of each sliding part is equipped with a sharp-pointed spike that will dig into the earth or other surface that such points won't damage. Cut a 9- or 10-penny common nail to a length of 1½ inches as measured from the point, select a drill bit slightly less in diameter, and in the end of the leg section drill a hole 1⅛ inches deep. Drive the nail into the hole so that the point projects ⅜ inch, then file off the head and point the end.

Carriage bolts are suitable for attaching the legs to the top. They should measure about 3¼ inches in length, not including the head. With a file or grinding wheel, remove the square portion of each shank just beneath the head, so the bolt will enter the hole in the leg section. Use a washer under each nut. Although standard nuts are used on the model illustrated, small wing nuts are better because they permit the legs to be locked against spreading; or cap nuts, which give a little more finished look than ordinary ones, can be used.

Before final assembly of the tripod, stain the wooden parts of the legs and the top to any color desired. Walnut stain is attractive. Then give the wood one or two coats of brushing lacquer, and let it dry overnight before putting the sections together.

Your tripod is now ready for the adjustable head. However, there is one refinement you can add if you wish. That is a spiderweb arrangement of strong cord or light chain, connecting the three legs at points near the lower end of the upper sections. You can install little hooks or screweyes in one of the outer strips of each leg, or solder rings to the lower leg bands, to receive the cord. This spiderweb arrangement acts as a brace to prevent the legs from accidentally spreading apart and wrecking the tripod and camera.

### The Pan-Tilt Head.

THE common practice of building tripods and their adjustable heads as separate units has little practical advantage. Most photographers never find it necessary to separate them. So, as a matter of logic and economy of time and materials, this tripod and its adjustable head are constructed as one unit. The fact that the panoramic and tilting mechanism of the head is made almost entirely of wood is noteworthy. Wood is easier to work than metal for the average builder and it is usually easy to obtain.

One of the best materials for the various wooden parts of the tripod head is straight-grained maple. Birch is equally

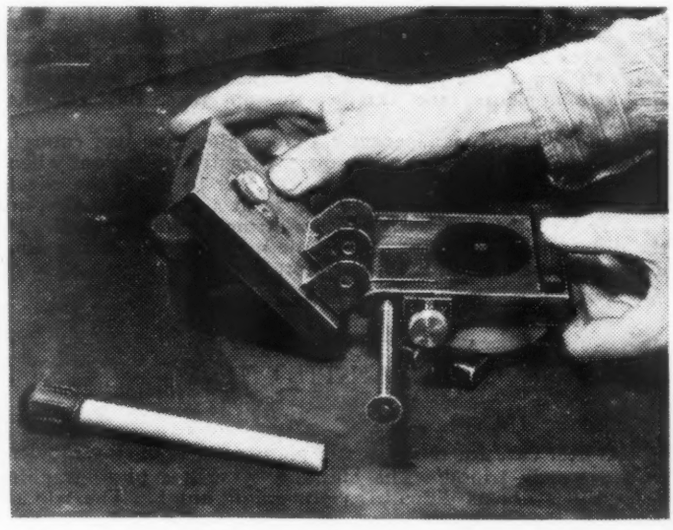


**Fig. 6. The tilting block is hinged to lower swinging block by means of the three L-shaped lugs engaged by a ¼-inch bolt.**

satisfactory. Lacking these, you can use walnut, ash, oak, or other hardwood. It is important that it be well-seasoned, and preferably kiln-dried.

The tilting portion of the top consists of two rectangular blocks of wood with a special hinge arrangement adjoining them. The swinging or panning adjustment (to make panoramic shots with a motion-picture camera, it is swung or "panned" in a lateral arc, hence the terminology) consists of one of the blocks and a disk of wood (see Fig. 4).

The top of the tripod consists of a hardwood disk ¾ inch thick and 3 inches in diameter. Resting on this is one of the two wooden blocks, which we shall call the swinging block (A in Fig. 5). For a 3-inch tripod top, this block should measure ¾ x 3⅛ x 4¼ inches. At a point 1⅝ inches from one end, and midway between the sides, make a circular hole 1⅞ inches in diameter and extending all the way through the block. There are several ways of forming this hole. If you have a lathe, mount the block on a face-plate and bore it to size. An expansive bit operated by a brace will do the job. With a drill press, you can do the work neatly by means of a boring bar having a fly cutter in it. The hole can be cut on a jigsaw. And if you lack all of these power tools, you

can do a good job by sawing the hole carefully with a hand scroll saw and smoothing it with a half-round rasp. The end of the block toward which this hole is located is the rear end of the arrangement.

From wood of the same thickness, next make a "pivot disk" that fits snugly but not very tightly in this hole. You can cut the disk with a saw or turn it to size on a lathe. With three flat-head screws 1¼ inches long, fasten this disk in the center of the disk forming the tripod top. Countersink the screw heads, and in the center of the pivot disk bore a hole to receive a flat-head screw about ¾ inch long.

Along the center of Block A, extending from the hole to the front end, make a saw cut. Now if you place the block on the tripod top, with the hole over the pivot disk, it should rotate rather freely until the front ends are squeezed to close the saw slot. The squeezing should lock the block so tightly around the pivot disk that it no longer can be rotated. If the block rotates with a jerky movement when loosened, there are some high spots on the pivot disk. Remove these with rasp or sandpaper. From rather stiff metal, sheet plastic ⅛ inch thick, or thin plywood, cut a disk 2 inches in diameter. In the center drill and countersink a hole to receive the ¾-inch wood screw, already mentioned, and fasten the 2-inch disk to the top of the pivot disk, the screw entering the hole previously drilled. Thus the Block A will swing around its pivoting disk, but the slightly larger retaining disk prevents it from coming off. If the clearance between the retaining disk and the pivot disk is not great enough, use some paper shims between the two.

As a matter of added safety, you can bore a hole laterally through the rear of Block A and insert a ¼-inch or 5/16-inch dowel. This is not usually necessary unless you observe a tendency of the block to split. Further strengthening is provided by a spacing strip, about ⅜ inch square, that extends across the top of the block and is set in slightly from the rear end. The tilting Block B rests on this spacer when in a horizontal position.

Next, from the same hardwood, cut a block the exact dimensions of Block A. This is designated as Block B in Fig. 5, and is the direct support of the camera. Place your camera on it, with the back parallel to one of the ends, and locate the spot where the tripod screw socket comes. At this point, drill a ¼-inch hole to receive a standard ¼-20 tripod screw having a knurled head. You can purchase these screws at most photo-supply houses, or if you have a lathe you can make your own. Some arrangement must be provided to prevent the screw from falling out. One way is to drill a hole in the center of a circular or rectangular metal plate, tap it to receive a ¼-20 bolt, and mount it over the hole bored in the block. With a file, remove the last four or five threads from the screw—the threads toward the knurled head. Then when you insert the screw into the threaded hole in the plate, it will pass through it easily but normally will not drop out when no camera is being held.

The tilting Block B is hinged to the swinging Block A by means of three-L-shaped lugs bent from stiff sheet metal such as 3/64-inch brass or monel (Fig. 6). Each lug requires a strip 1 inch wide and 1⅝ inches long, one end of which is rounded to a ½-inch radius. Drill a ¼-inch hole at the center of this radius (½ inch from the sides and end), and at a point ½ inch from the other end, make a right-angle bend, to form the "L". In this bent-over portion, drill two holes to receive ½- or ⅝-inch mounting screws.

Return momentarily to Block A, and along lines ⅜ inch from each edge and extending back for 1½ inches from the front end, make saw slots a wee bit wider than the thickness of the metal used to make the L-shaped lugs. At a point in the sides ½ inch from the front end and midway between top and bottom, bore a ¼-inch hole through the block from side to side. This is to receive a ¼-inch bolt or rod with a threaded end, and having a wing nut or knurled knob that can be screwed down against the wood. Thus, by tightening the knob, you can squeeze together the three slots in the block, and lock it around the pivot disk attached to the tripod top.

Insert the three L-shaped lugs into the saw slots, align their ¼-inch holes with the hole bored through Block A, and push the threaded rod or bolt through. Rest Block B on the turned-over parts of the lugs and on the spacing strip across the rear of Block A, and mark the holes in Block B for the lug mounting screws.

After the lugs are fastened, the two blocks should be parallel and square with each other when Block B is in the horizontal position; and Block B should swing easily to a vertical position without binding. With the blocks thus assembled, the adjustable head is almost complete. Tightening the knurled knob locks both the tilting and panning adjustments at the same time. Because of the relatively large frictional surfaces between the lugs and the sides of the saw slots, and between the disk and the hole in the swinging block, the rigidity is surprising. It can be increased still more by increasing to five the number of lugs forming the tilting hinge.

In the center of the rear end of the tilting Block B, mount a handle of some sort. This can be a plastic or wooden file

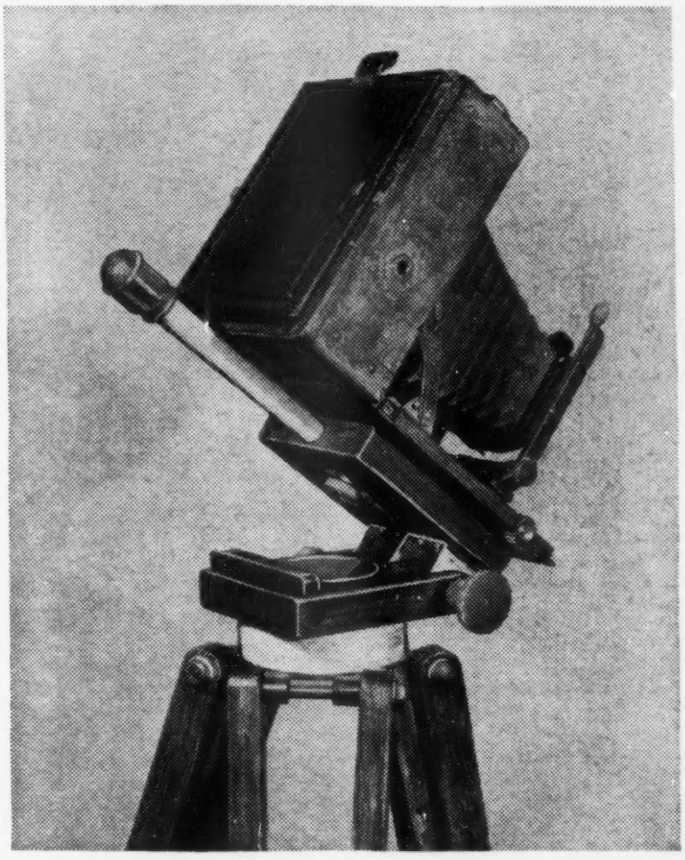


**Fig. 7. Pan-tilt head permits camera to be locked at any angle from horizontal to vertical and swung through a complete circle.**

handle, or something of similar shape. It normally is grasped with one hand to control lateral and vertical movements of the camera, while the other hand is used to lock and unlock the moving parts. In some respects, this is a surer way of controlling the adjustments than if the knob at the rear actuated the locking mechanism too.

If you have occasion to move the head laterally while the tilting hinge is locked firmly—as in panning with a motion picture camera—you can add another control in the form of a ¼-inch bolt or threaded rod, equipped with a knurled head, that extends horizontally half-way through Block A at a point just in front of the disk hole. When this rod is screwed in all the way, its end rests against the opposite side of the central saw slot and prevents the halves of the block from being squeezed together around the pivoting disk. When the rod is unscrewed a turn or two, the block locks around the disk in the normal way.

To prevent denting of the wood, a piece of sheet metal can be inserted between the rod end and side of the saw slot. If the threads are simply cut in the wood, they will endure much service; but if you want greater strength, use a threaded plate mounted in a recess on the side of the block.

You can place the locking knob on the right or left, as you wish; or you can use two knobs, one on each end of the rod passing through the tilting lugs. The bolt or rod that is used to disengage the swing lock can be inserted from either the right or left edge of Block A, whichever is more convenient.

The model head shown (Figs. 4, 5, 6, and 7) has a tilting block made of walnut, while the rest was made of birch—the result of a lumber shortage in my shop The birch was stained to a walnut color, and all the exposed wood surfaces given two coats of brushing lacquer. Frictional surfaces between the swinging block and the disk can be lacquered, too, or simply given an application of linseed oil and permitted to dry thoroughly. A good spar varnish is suitable for finishing wooden parts, or the linseed-oil treatment can be used

throughout. Apply the oil, preferably heated a bit, and rub it into the wood with the fingers. Wipe off excess, and let stand for a day or two. Repeat the application. Usually two coats are sufficient. Be sure you use a good grade of genuine linseed oil.

The various metal parts can be lacquered for protection. Brass can be left as it is, or blackened chemically. Monel metal, which you often can obtain in scrap form from a tinner, needs no treatment other than polishing.

## REMOTE SHUTTER TRIPPER.

IN photographing birds and animals the person who operates the shutter generally has to remain at some distance from the camera. Various kinds of remote shutter controls have been devised, but about the most reliable consists of an electromagnet tripping unit operated by a battery.

The illustrations show trippers made from electric "kick motors" that were built originally for operating animated cardboard signs in store windows, etc. The electromagnet is surprisingly powerful, considering that it requires but one or two flashlight battery cells. It is encased in an iron housing to which is pivoted an armature. You may be able to obtain a "motor" of this type from a store or garage that at one time had an animated sign in operation. The units, to my knowledge, were never on the open market, but were used in advertising dry batteries, automobile anti-freeze, and flashlights. If no such unit is to be found, you can use the magnets and armature from a small door bell or buzzer designed to operate at 6 volts or less.

Mount the magnet unit on the camera in such a way that a stiff wire or rod can be extended from the outer end of the armature to the shutter-release lever or button. The exact manner of accomplishing this will depend on the construction of the camera and the unit. Figure 8 shows a tripper attached to a miniature camera by means of a lug or tongue soldered to the bottom of the coil housing, this lug engaging the standard accessory clip on top of the camera. The rod running down from a hole in the armature to the recess in the release button has a collar equipped with a set-screw, to permit adjustment of the length.

In Fig. 9 is shown a tripper attached to a viewtype camera for operating a between-the-lens shutter. The magnet

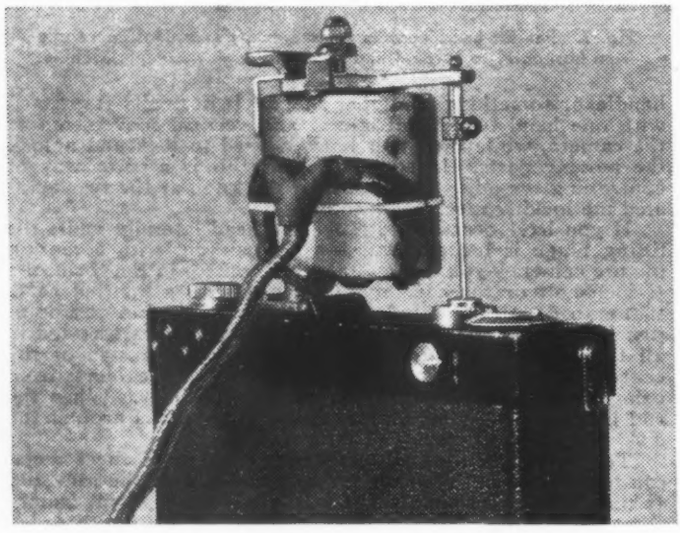


**Fig. 8. Magnetic shutter tripper mounted on a miniature camera by means of a lug which engages the standard accessory clip.**

unit is fastened to a bar running across the front of the camera and having two clamping devices, resembling C-clamps, that are fastened to the finger grips used for moving the front in or out when opening or shutting the camera.

The voltage of the battery used to operate the tripper can be found by test. The control wire will absorb some current, and it should always be in the circuit when making tests. When the tripper is sensitive enough to operate on two or three flashlight cells, an ordinary flashlight can be used, as illustrated in Fig. 10. Remove the lens and lamp, and fit the end of the pair of wires from the magnet—ordinary lamp cord is excellent—with a plug made from the base of a burned-out flashlight lamp. Solder one wire to the inside of the threaded shell of the base, the other to the center point, after the glass and cement have been removed. Pour a little sealing wax or paraffin into the base, to hold the wires more securely. This plug screws into the lamp socket of the flashlight.

If you have a flash synchronizer that employs an electromagnetic shutter tripper, you can, of course, use it for remote-

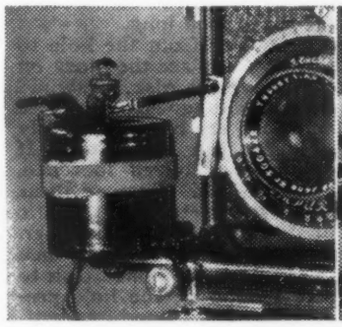


**Fig. 9. The tripper attached to a view-type folding camera.**

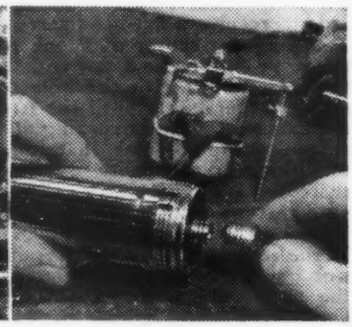


**Fig. 10. A flashlight provides power for the shutter tripper.**

control shooting, with or without flashbulbs. All you have to do is provide enough wire to extend from the camera to the control point. Conversely, the tripper units illustrated can be used as synchronizers if they happen to match the flashbulb and shutter timing.

Shutter trippers of this kind can be used in camera traps for securing pictures of thieves who, by opening a drawer or performing some other action, close the circuit and take their own photographs.

## HOME-MADE LENS SHADES.

A LENS shade or hood should be a permanent part of every lens because, by keeping out stray light, it increases the brilliance of the picture. Lens manufacturers usually omit this essential because, to make it an integral part of the lens barrel, they would have to make the lens so bulky that it could not be contained easily inside a folding camera. Also, photographers seem to prefer variety in their lens shades.

There are various ways in which you can make your own lens shades. Three designs are shown in the drawings, and an almost endless variety of others can be worked out. In Fig. 11A the shade consists of a length of rubber hose or plastic tube whose internal diameter is approximately the same as the outside diameter of the lens barrel. Sometimes you can find a section of rubber hose that will fit the lens snugly without further treatment. However, if the hose is somewhat oversize, it still can be used. Wind two or more turns of strong cord or wire around the end that goes over the lens barrel, to squeeze the inside diameter down to the barrel size. Use iron wire, and lacquer or otherwise treat it to prevent rusting. Copper wire is likely to stretch in time, although it may never give you any trouble.

If you use a plastic tube, such as a form on which radio coils are wound, you may have to ream out the inside of one end a little, to make it slip over the barrel. If the tube is too large, you can run a layer or two of felt or soft cloth around the inside, letting it project beyond the end so it can be turned back ¼ inch or so over the outside. One way of fastening this padding is to cement it to the tube with a suitable adhesive. Another way is to drill a row of small holes around the tube about ⅛ inch from the end, and sew the padding in place by running a thread through it and the holes.

Whatever the construction, the length of the lens shade should be such that maximum shading is provided without cutting into the cone of light entering the lens. The best way of determining the length is by actually testing the shade by looking diagonally through the lens with the camera back off, using the corners of the picture aperture (film gate) as sights. If you can see the front end of the shade, it is too long.

Another cylindrical lens shade is shown in Fig. 11B. This particular construction was used for a shade machined from a brass tube and used on a miniature camera for more than six years. It consists simply of a length of tubing with one end turned down on a lathe and slotted with a jeweler's saw

to form a row of thin fins that spring slightly inward or outward when the shade is attached to the lens. The fins may go inside the lens barrel, or over it, depending on the lens construction. The inside surface of the shade is either given a coat of non-reflecting paint, or machined into thread-like grooves and then painted.

In Fig. 11C is shown a lens shade made from a 5-cent plastic measuring cup. The ¼-cup size will fit lenses up to

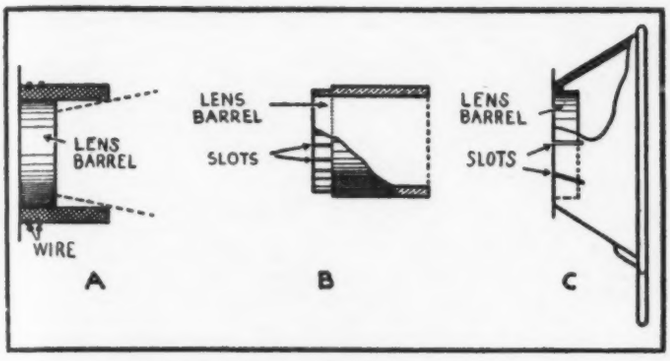



**Fig. 11. Effective lens shades made from (A) rubber or plastic tubing; (B) piece of brass tubing; (C) plastic measuring cup.**

about 38 mm in diameter. Cut a circular hole in the bottom a wee bit smaller than the diameter of the lens barrel. With a jeweler's saw or other fine-bladed saw, make slots at intervals of ½ inch, extending inward about ⅜ inch. These slots permit the segments between them to spring slightly, thus enlarging the hole when the shade is slipped on the lens. With a file or abrasive paper, you can dress down the edges of the opening until the shade fits snugly, but is easy to remove and replace. The handle of the cup can be cut off or left in place, as desired.

Photographers have made lens shades out of the most surprising objects. A rubber bulb from a hydrometer or air-operated shutter can be cut to form a shade which, like one made from a length of hose, is not easily damaged by rough handling. A metal or plastic funnel can be made into a lens hood by the method described for the measuring cup. Collapsible drinking cups of metal or plastic are another source. Oil cans with spouts and bottoms removed become serviceable hoods. Cardboard mailing tubes or cylindrical pill boxes painted with lacquer or shellac and fitted to the lens barrel will last a surprisingly long time.

There are various ways of incorporating a color filter into a lens shade. Probably the simplest is to use a filter that fits the lens barrel, and then make the shade to fit the filter ring. Some filters are made so the mount has the same outside diameter at the front end as the lens barrel they fit. Thus a lens shade that fits the barrel can also be slipped over the filter.

When maximum shading effects are desired, a mask having a rectangular opening of the same relative dimensions as the negative, is fitted in the front end of the lens shade. The mask must be accurately made, and the shade must be installed so the edges of the opening line up with the edges of the image on the film.

A lens shade that reflects light from its inner surface is often worse than useless. To prevent such reflection, a black paint having an absolutely matte surface is generally used. A rubber shade can be treated with dull-finish tire paint. Sometimes black India ink will do. For metal and plastic shades, a lacquer that dries to a dull finish can be used. If you cannot purchase such optical lacquer from an optical store, you can make it yourself by mixing drop black or lamp black in well-thinned shellac, brushing lacquer, or oil paint. The outside of the lens shade can be left as it is, or finished with brushing or spraying lacquer, oil enamel, synthetic enamel, or baking enamel. If you dip a clean brass lens shade into used hypo solution for a few minutes, it will receive a thin plating of silver. When protected by a coat or two of clear lacquer, the silvering will remain bright for many months of ordinary use.

---

If a view camera or other folding type is opened or closed suddenly, the bellows may be damaged. It is for this reason that vent holes usually are provided in the back of a professional view camera. If such vents are covered with air filters made of porous cloth, less dust will be drawn into the camera when it is opened.

## LENS CAPS.

A VALUABLE lens should be protected, when not in use, by a cap that keeps out dirt and wards off blows. If the lens is detached from the camera, as frequently are the auxiliary lenses of a miniature camera, there should be a cap over both ends. There are various kinds of caps you can make with simple tools.

### Leather Caps.

Leather has been used extensively for making lens caps, and will give long service. While manufactured leather caps are sewed together, you can use pyroxylin household cement or similar adhesive. From a shoe repairman obtain a piece of sole leather large enough to cut a disk somewhat larger than your lens barrel. Obtain also some thinner but fairly stiff leather pieces from which you can cut strips about ¼ inch wider than the disk is thick. Glue a strip around the circumference of the disk so the two pieces form a shallow cup. In doing this, follow the directions on the adhesive container for use with porous materials. The ends of the leather strip can be butted or lapped, the latter being somewhat the stronger. Bevel the leather so the joint is the same thickness as the rest. Now cut another, narrower leather strip and run it around inside the first. The inside diameter as determined by this strip should be just enough larger than the diameter of the lens barrel to permit a lining of thin velvet to be cemented in place. The outer edge of the lining should be a selvage, to prevent unraveling. Give the leather a coat of good shoe polish, preceded by a dye if necessary. Of course, all sharp and irregular edges should be trimmed from the leather before applying any finish.

### Cardboard Caps.

By using tough cardboard or fiber, you can build up a lens cap that is surprisingly strong. Both the center disk and the rim are built up of several thin layers held together by

**Fig. 12. Shaping lens cap from a disk of copper. Cap on table was made from monel metal and lined with adhesive "moleskin."**

pyroxylin cement, casein glue, plastic cement, or any other adhesive that is reasonably strong. The adhesive should be of fairly thin consistency so it will penetrate the cardboard and stiffen it. Assemble the cap in the same way you would one of leather. Install a velvet lining to protect the lens barrel, and finish the outside of the cardboard with two or three coats of brushing lacquer.

### Plastic Caps.

Plastic bottle and jar caps sometimes are of the right size to make serviceable lens caps when the threads have been removed. This removing can be done on a lathe, with a rotary file in a hand grinder or drill press, or with a sharp knife or chisel. A velvet lining can be installed, but is not necessary; if sharp edges are removed with abrasive cloth, the plastic is not likely to scratch the lens barrel.

**Metal Caps.**

If a lathe capable of being used for metal spinning is available, caps of professional quality can be made from brass, aluminum, monel metal, or stainless steel. First turn a steel form to the exact diameter you want the inside of the cap, and then spin the metal over it in the usual way. However, since relatively few photographers have metal-spinning facilities, a less complicated way usually must be followed.

A metal cap can be assembled by soldering a strip to a disk, much in the manner of making a leather or cardboard cap. Tinplate can be used, but sheet brass, monel metal, or stainless steel is better. You can make a one-piece cap from copper or other ductile metal as follows: Obtain (or machine) an iron or steel rod whose diameter is the same as that of the lens barrel or a fraction less. Cut a disk of metal to a diameter about ½ inch greater than the diameter of the rod (form). This allows a ¼-inch turn-down all around. Lay the disk on the form, and with a small hammer force the overhanging edge down over the sides (Fig. 12.) Hammering will harden and stiffen the metal, so you will have to anneal it a few times before the cap is finished. Do this by heating the cap disk almost to redness. You can cool copper or brass by plunging it into water, but steel should be allowed to cool slowly in air. By persistent tapping, you can turn the cap rim down without a wrinkle or crack. The slight hammer marks that probably will show are seldom objectionable. Polish the metal with a wire brush, steel wool, or abrasive cloth. The cap may fit the lens so snugly that it does not require slitting. Otherwise, make a series of slits about ¼ inch apart around the rim, so the resulting segments can be sprung inward or outward to vary the diameter. If the edges are smoothed, the cap requires no lining. You can, of course, make it a bit larger and cement a velvet lining in it. This is a good method with copper which, not being springy, has a tendency to loose its grip.

Lens caps also can be made of laminated paper and any other material that can be persuaded to preserve the required shape. If rubber is preferred, however, it is best to buy a ready-made lens cap, as manufacturers use a good grade of rubber that will not release chemicals which might harm the lens. An innovation that has not hit the photographic market, but which you may want to consider, is a cap made of transparent, optically-flat glass or plastic that can be left in place while a picture is being taken. Probably such a cap would be an advantage only in an emergency such as a news photographer might encounter, or when working where water, dust, or other matter might damage the lens surface.

## PINHOLE LENSES.

THE simplest form of camera lens consists of a small hole in a thin piece of opaque material. It is used just like an ordinary lens, but there are some important differences in its performance. A pinhole "lens," being of extremely small aperture, is very slow and requires many times the exposure of the slowest glass lens. It never produces a needle-sharp image, but the softness of a pinhole picture may not be objectionable—in fact, it may be desirable from a pictorial standpoint.

A pinhole lens is always in focus, and may function as an extreme wide-angle lens, a telephoto lens, or anything in between. A pinhole photograph is more nearly a faithful likeness of the subject than any other kind, and for that reason is often used by architects and others who want to make undistorted pictures of buildings and similar subjects. Because a pinhole lens can be placed very close to the film and will include an extremely wide angle of view, it permits otherwise impossible photographs of tall buildings to be made from "just across the street."

You can make a pinhole lens for your camera in five minutes. The opaque material can be either a sheet of black paper of the kind used for packing films, a piece of metal foil, or some bronze shim stock from 0.001 to 0.005 inch thick. With a needle, make a smooth, round hole in the paper or metal. The size of this hole is important, and on it will depend the sharpness of the picture as well as the speed of the lens. As a rough guide, you can use the following figures:

For a 40-inch distance between lens and film, the hole should be about 0.050 inch in diameter, approximately the size of that made with a No. 1 needle.

For a 10-inch focus, about 0.025 inch (No. 7 needle).

For a 3-inch focus, about 0.015 inch (No. 12 needle).

The best way to determine the exact diameter is to measure with a micrometer the needle that makes the hole, particularly when you do not know the needle number.

If you use thin metal, the edges turned back by the needle should be smoothed down. When the metal is thick enough, you can proceed as follows: First make a dent with a fairly blunt needle, and grind off the resulting bump by rubbing the metal on an abrasive stone. Then, with the needle, form the hole to the proper size.

Fasten the pinhole lens over a hole in a piece of stiff cardboard, and mount this in turn on the front of the camera (Fig. 13). If you are using a view camera, you can make a lensboard to replace that supporting the regular lens. The cardboard can be fastened in place with adhesive tape.

When metal is used for the pinhole, blacken the edges around the hole by holding it in a match or candle flame. This reduces reflection.

Exposure can be determined by trial, or some system

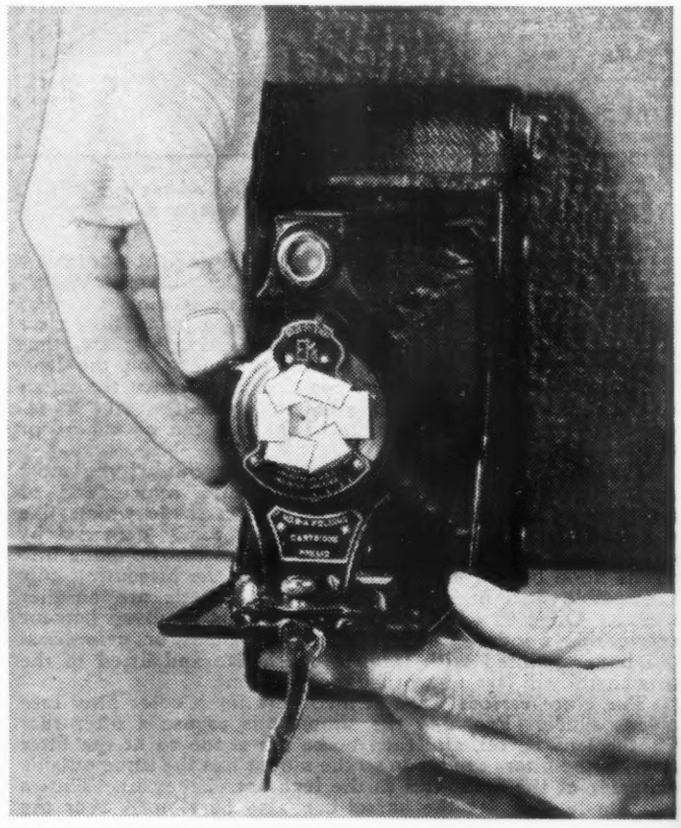


**Fig. 13. Pinhole lens made from thin sheet of brass is fastened to camera with adhesive tape; glass lens has been removed.**

of calculating it may be used. In making test exposures, think in terms of seconds and minutes, rather than fractions of a second. The *f*-value can be determined for the three pinhole sizes given, as follows:

0.050 inch..Multiply film-to-lens distance in inches by 3
0.025 inch..Multiply film-to-lens distance in inches by 7
0.015 inch..Multiply film-to-lens distance in inches by 11

The resulting *f*-number can be used with any exposure meter or table, but the resulting exposure will be in **minutes** or fractions rather than in seconds. Example: a 0.025-inch pinhole 10 inches from the negative. The *f*-value is 7 × 10 or *f* 70. Using this value with an exposure meter, the indicated exposure is 1½ seconds. However, in making the pinhole exposure, you expose for 1½ minutes. This method of calculating may not prove exact, because of variation in pinhole size, etc.; but it will serve as a starting point for tests.

Exposure meters usually are not made to indicate for apertures smaller than *f* 32 or *f* 45, so you may have to do a little roundabout figuring when working with pinhole apertures. Here is a simple way of using the meter: Divide the pinhole aperture by 4, and use the resulting number as the aperture on the meter scale for which the reading is taken. Multiply this reading by 16 to give the true reading.

For example, with the *f* 70 pinhole, divide 70 by 4, to get

17.5. In reading the meter, note the time indicated opposite *f* 17.5 (approximately *f* 18), and you find it to be 1/10 second. Multiplying this by 16, you get 16/10 or approximately 1½ seconds. But since this is a pinhole lens, the exposure will be 1½ **minutes.** For extremely small apertures, divide by 8 instead of 4, and multiply by 64 instead of 16.

Photographers who have to make a picture of a tall building from across the street find it advantageous to mount the pinhole so it is about even with the top edge of the film (which should be vertical), and to tilt the top of the pinhole mounting back somewhat. This produces better coverage and more even exposure.

You can use a pinhole lens in conjunction with the regular camera lens to produce enormous depth of field. Simply mount the pinhole in front of the regular lens, after the camera has been focused, and give an exposure that would be about right if the pinhole alone were used—or a little more, to compensate for absorption of light by the glass. The sharpness of such a picture is greater than that of a straight pinhole photograph. Focusing is much easier because the camera lens alone is used. If you want to make a picture with the lens very close to the film or very far away from it, simply proceed as if the regular camera lens were not there. The enormous depth of field of the pinhole keeps the image reasonably sharp even if the glass lens is extremely out of focus.

## EASILY-BUILT SPOTLIGHT.

EVERY photographer should have a spotlight if he does any indoor shooting at all. There is no single item of lighting equipment that will extend the camera's horizons farther, whether the pictures be in the field of portraiture, figure work, still life, tabletop, advertising and illustrative photography, or copying.

The spotlight illustrated in Fig. 14 shows, first of all, what can be accomplished with simple materials—an empty 5-pound sodium carbonate can, two small T-hinges, a 5/8-inch pipe tee with plug, old automobile gear-shift knob, and a pot lid or something similar. The light has a 4-inch plano-convex con-

**Fig. 14. This adjustable spotlight is made largely of odds and ends. It uses a 500-watt projection bulb and is very efficient.**

denser lens and uses a 500-watt T-20 projection bulb; but of course some other type and size of lens or lamp can be used to fit the builder's needs or materials at hand.

### The Lamphouse.

An empty 5-pound sodium carbonate can 6 inches in diameter and 6¾ inches high was used. Satisfactory houses can be made from round or rectangular 1-gallon or 5-quart automobile-oil cans, sections of 7-inch stove pipe, or galvanized furnace tin bent to shape.

The bottom of the can becomes the front end of the spotlight. The seam in the side of the can will, in the finished unit, run along the bottom of the lamphouse. On each side of this seam, and about two inches from it, draw parallel lines. Along the left-hand line as you face the rear (open) end of the housing, punch or drill six ¼-inch holes about ¾ inch apart. Along the other line, at a point beginning about 2½ inches from the front and extending for 3 inches toward the rear, cut a slot about ¼ inch wide. This slot is to permit movement of the knob that controls the lamp position; and it, together with the holes, admits air to the bottom of the house. To let the heated air out, make two more lines of

**Fig. 15. Fastening the trough-shaped metal piece to pipe tee.**

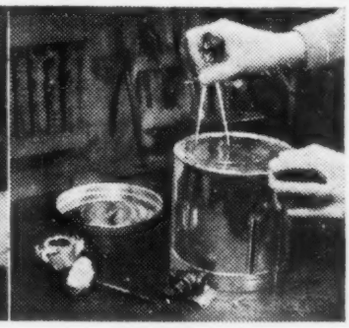


**Fig. 16. Scribing a circle on end of can for lens opening.**

¼-inch holes 4 inches apart and equidistant from the top line of the lamphouse. Cut four strips of tinplate about 1 inch wide, bend the ends down to permit riveting, and fasten them inside the can over the ventilating holes to form light baffles. Distance between baffle and housing should be ¼ to ⅜ inch.

### Lamp Adjustment.

The lamp has to be arranged so it can be moved easily forward and backward to control the size of the spot of light. The lamp socket, of a standard size to receive a medium-screw-base lamp, should have as little height as possible. One form of socket that will do is that intended for installation inside a standard wall outlet box (such as the type shown in Fig. 21). This particular one has a porcelain body; the two mounting ears were removed. If there is any sealing wax filling holes in the socket block, dig it out, for it will melt out later. The socket is mounted, by means of two 6-32 bolts passing through holes already in the porcelain block, on a sliding support bent from a piece of rather stiff sheet metal measuring approximating 2¼ inches wide and 2½ inches long.

Before bending this support to shape, make the track on which it is to slide. This track is a strip of brass or other metal about 3/32 inch thick, 1⅜ inches wide, and about ¾ inch shorter than the housing. Use this track as a form in bending the socket support to the shape shown (Fig. 18). The bends are made parallel to the 2½-inch dimension. Near the corners of the track, drill and tap holes to receive 6-32 bolts that pass through holes in the bottom of the housing. Use two or three washers to separate the track and housing enough to permit smooth back-and-forth movement of the socket support.

At the right, rear corner of the socket support, when facing the rear of the lamphouse, rivet or hard-solder a strip of

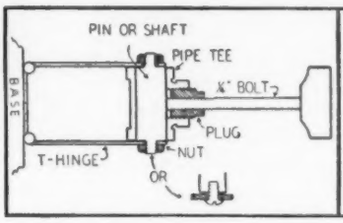



**Fig. 17. Tilting mechanism.**

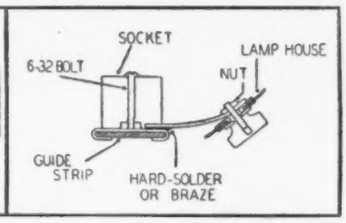



**Fig. 18. Lamp socket adjustment.**

stiff metal about ½ inch wide and long enough to curve around the housing past the 3-inch slot. Drill and tap a hole to receive a 6-32 bolt passing through the slot. On this bolt is fastened the knob that controls lamp adjustment. The knob can be screwed down tightly to lock the lamp in position. It is a good idea to braze or hard-solder a nut over the hole in the ½-inch strip, rather than depend on a tapped hole in the thin metal (Fig. 18).

Wires run from the socket to the power source through a hole made in the bottom of the housing about 1½ inches from the rear, and at one side of the track. Bush this hole with a plastic or porcelain grommet, or at least make the metal

smooth enough to prevent damage to the wire insulation. Use asbestos-covered iron or heater cord for carrying current to the spotlight socket. Rubber-covered wire is almost certain to give trouble because of the effect of heat on the insulation.

Screw the lamp into the socket, adjusting it so the plane of the filament coils is parallel to the ends of the housing. The center contact of most sockets is a metal strip that can be bent up or down to vary the amount the bulb must be screwed into the socket to make good contact. Another way to adjust the lamp is to apply a drop of solder to the center of the bulb base, which already is soldered, and file it to the required length. Be careful not to heat the lamp base enough to damage it. At a point directly in front of the center of the filament area, make a mark on the front of the lamphouse. Using this mark as a center, scribe a circle about ¼ inch less in diameter than the diameter of the lens to be used (Fig. 16). Cut out the circle with tin-snips, and smooth the edges with abrasive cloth.

**The Lens.**

The spotlight shown uses a single plano-convex condenser lens 4 inches in diameter. Similar lenses can be obtained from various mail-order photo-supply houses or through local dealers. The diameter may vary quite a bit without seriously altering the performance of the spotlight, but 4 or 4½ inches seems to be about right. The greater the lens diameter, the longer the focal length.

Usually you can find an empty tin can of a size to make the ring that holds the lens in position. Cut out the bottom of the can to within about ⅛ or 3/16 inch of the side all around; and make a cut around the side about ¾ inch from the bottom. You now have a ring that, when placed around the lens, forms a rim or guard extending out ¾ inch from the front of the lamphouse. Make three lugs from tincan stock and fasten them at equidistant points around the ring. Drill the lugs to receive mounting bolts or screws. When you finally assemble the lamp, you can use strips of asbestos paper to fill between the lens edges and the ring, to prevent lens rattle.

The lid of the carbonate can forms the back of the lamphouse. It requires no altering other than refinishing. However, to eliminate spotty reflections when no mirror is used behind the lamp, cut a disk of asbestos paper and fit it inside the lid. Also paint the inside of the lamphouse a dull black, to kill reflections. Drop-black mixed with thin baking enamel does nicely; or apply stove polish but do not polish it.

**The Base.**

The base of the spotlight shown is a metal spinning that happened to be on hand. It resembles a pot lid; and in fact a sturdy, circular lid 7 to 8 inches in diameter makes an excellent base. Or you can use a disk turned from maple, walnut, oak, or other wood.

Extending up from the base are two stiff metal strips supporting the tilting arrangement on which the housing is

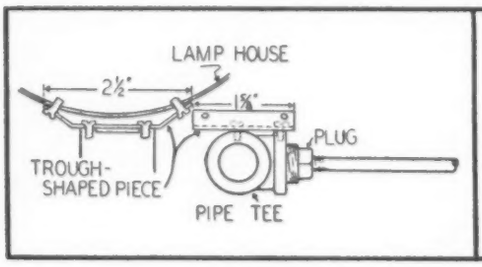



Fig. 19. Spotlight tilting mechanism and method of attaching it to the lamphouse.

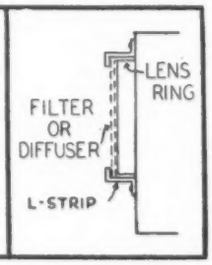



Fig. 20. L-strips hold masks, color filters.

mounted. Two T hinges having straps 3 inches long were used in the lamp shown, and have proved to be entirely satisfactory. Because the tips of the straps are held rigidly by a short rod or pin, it is impossible for the hinges to swing sidewise.

**Tilting Control.**

The tilting arrangement is made from a ½- to ¾-inch pipe tee and a plug to fit the side opening. The threads in the straight-through part can be left in or bored out, as desired. Obtain a piece of shafting slightly smaller than the hole through the tee to make a pin on which the tee can be rotated. If you have a lathe, turn the ends down to ¼ inch, and thread the resulting studs with a ¼-20 die. The length of the unreduced portion of the pin should be about 1/16 inch greater than the corresponding length of the tee. If you have no lathe, cut the shaft 1/16 inch longer than the tee, and drill and tap the ends to receive ¼-20 bolts.

Screw the plug tightly into the side opening of the tee, drill a hole centrally through it, and tap it to receive the

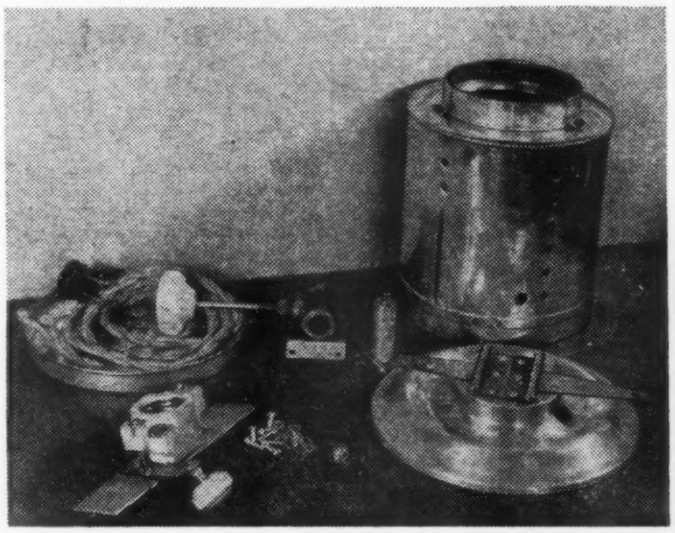


Fig. 21. Essential parts of the spotlight—(rear) cord and plug, tilting device, lamphouse; (foreground) socket assembly, base.

threaded portion of a ¼-inch bolt 4 or 5 inches long. Equip the head end of this bolt with a generous-sized knob made of some material that doesn't conduct heat readily. A plastic automobile gear-shift knob is ideal.

From a piece of stiff sheet metal 1⅝ inches wide and about 2⅝ inches long, make a trough-shaped plate that will fit against the bottom of the lamphouse, with about ⅛ inch clearance at the center. Lay this plate against one side of the pipe tee, the trough parallel to the ¼-inch bolt, and mark it for mounting screws. Drill the plate, and drill and tap the tee to receive short 6-32 bolts. One of these bolts extends down into the plug in the side opening, locking it in place (Fig. 15).

Fasten the trough-shaped plate to the bottom of the lamphouse, preferably with self-tapping screws. Run the pin through the tee and fasten it with cap nuts or short bolts, between the tips of the hinges. The two screw holes originally in the ends of the hinge can be reamed out for this, if necessary. Now you can tilt the lamphouse up or down, and lock it securely in any position by turning the knob that projects beyond the rear. This arrangement, although made of junk-box parts, is one of the sturdiest and smoothest-operating tilting adjustments to be found on any spotlight (Figs. 17 and 19).

Before assembling the spotlight permanently, it is desirable to finish the various parts by applying some kind of lacquer or enamel. For the lamphouse, lid, and ring that holds the lens in position, wrinkle baking enamel is excellent. This enamel can be brushed on, but spraying is better. Commercial finishing plants will enamel the parts for a few cents. The hinges, pipe tee, and shaft of the tilting control knob can be given one or two coats of brushing lacquer of appropriate color. The base is finished according to the material from which it is made. Figure 21 shows the spotlight parts before finishing and assembly.

**Suggested Refinements.**

There are several ways in which you can increase the scope of this spotlight. One is to drill a hole in the bottom of the base with a No. 7 bit, and tap it to receive a ¼-20 screw. This permits you to mount the spotlight on a tripod, using the tripod screw to secure it. If the pot lid or other piece used as a base cannot be easily drilled and tapped, mount a disk of maple under it. A threaded hole in maple will hold for a long time: or you can inlay a threaded brass or steel plate in the wood.

A clip arrangement mounted on the front of the lamphouse is useful for holding color filters and diffusing screens. This can be simply two L-shaped strips of tinplate projecting

about 7/8 inch—one, about 5 inches long, being mounted just below the lens ring, the other, 2 inches long, above it. Thus there is a 1/8-inch space between the bent-over portion of the clips and the lens ring, in which color filters, masks, etc., can slide (Fig. 20).

## BAKING-PAN FLOODLIGHT.

A TEN-CENT baking pan made of tinned sheet iron is the starting point for building a handy floodlight unit like that illustrated in Fig. 22. The pan measures 5¼ x 9¼ inches at the top and is 2¾ inches deep. It will accommodate a No. 1 floodlamp or a 500-watt T-20 projection lamp. Either by using a larger pan of similar shape, or fastening two or more small ones side by side, you can make a multi-lamp flood unit.

The unit is made to fit a small folding stand of the type often used for supporting photographic lights, and is arranged

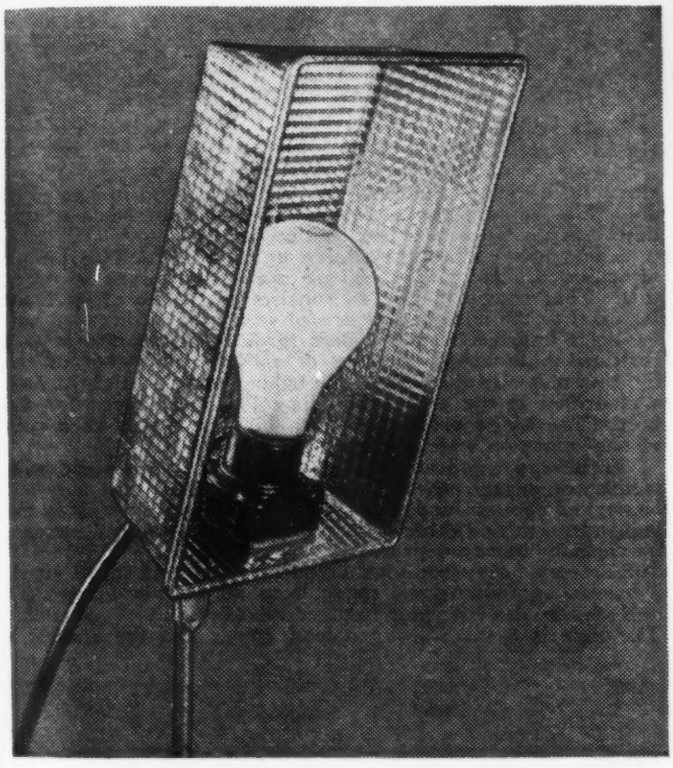


**Fig. 22. Simple baking-pan floodlight. Front of the socket is elevated by tin step soldered to sloping bottom of reflector.**

to tilt vertically through an arc of about 180 degrees. The tilting mechanism is made from a strap hinge about 1 inch wide and 3 inches long (total of both leaves, 6 inches). File one end of the hinge pin until it can be driven out. With a hack saw, make two slots in the leaf that has the two turned over portions, for a distance of about ½ inch, as shown in Fig. 23. Reassemble the hinge, using a small stove or machine bolt to replace the original pin. Put a lock washer under the nut, and hammer the end of the bolt so the nut will not drop off if it becomes loose. By tightening the nut, you can squeeze the hinge joint together—because of the saw slots—and create sufficient friction to hold the lamp unit in any position.

Hinges of this type usually have three screw holes in each leaf. Lay one leaf on the back of the pan, with the joint a fraction of an inch beyond one of the ends, and mark the screw holes. Punch or drill the bottom of the pan to receive short bolts. Place the two bolts nearest the hinge joint with their heads outward. In the third hole, near the tip of the leaf, place a longer bolt with its head inside, and on it screw a knob made of wood or heat-resisting plastic. A wood screw may be better than a bolt, particularly with a wooden knob. This knob serves as a handle for adjusting the reflector when it is hot.

The other leaf of the hinge has to be arranged so it can be attached to the music stand. Usually the upper section of the stand will be simply a tubular piece. From tin-can material, you can bend a socket that will slide over the hinge leaf and into which the tubular piece can be slipped (Fig. 24). Another way is to solder or otherwise fasten a short length of metal tubing or pipe to the hinge, the diameter of the piece being such that it will slip rather snugly over the stand tube. If necessary, you can install a winged or knurled setscrew to lock the socket against turning.

For holding the lamp, use a surface-mounting, medium screw socket made of plastic or porcelain. So that it will rest on an even keel on the sloping end of the baking pan, solder to the pan a little shelf made by bending a strip of tin-can material 1½ inches wide into an L shape. In the back of the reflector, about 1 inch from the bottom and ½ inch from the hinge leaf (on either side), punch or drill a hole through

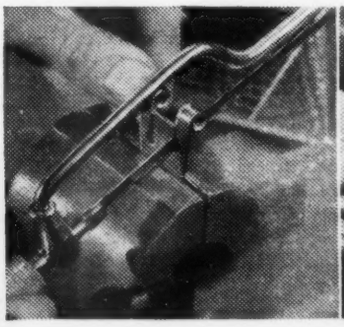


**Fig. 23. Sawing slots in hinge leaf so joint can be clamped.**

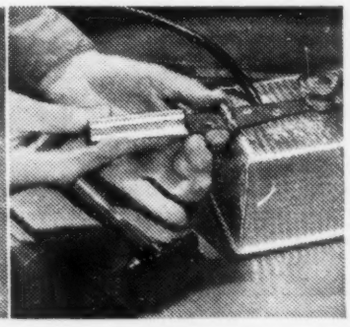


**Fig. 24. Sliding socket made of tin holds lamp on music stand.**

which a lamp cord (preferably the heat-resisting type used on electric irons) can pass to the socket. A plastic or porcelain grommet should be placed in the hole to prevent the edges from cutting into the wire insulation. A through-cord switch installed about 2 feet from the lighting unit is convenient for turning the lamp on and off.

This completes the floodlight unit. If the baking pan is of the crinkled type shown, the light distribution with a No. 1 floodlamp will be surprisingly uniform. If it is too spotty, try painting the inside of the reflector with white casein paint. This paint has an extremely high reflection factor and a matte surface that diffuses the light effectively. The hinges, stand socket, and exterior of the reflector can be given any finish desired. The reflector, however, should be painted with a heat-resisting material if at all, for it becomes hot enough, with prolonged use, to damage ordinary paint.

The baking pan illustrated is just deep enough to enclose a No. 1 floodlamp completely, and so it has a fairly wide angle of light distribution. If you want to control this angle by narrowing it laterally, attach two hinged leaves to the vertical edges of the reflector. These are simply rectangular pieces of sheet metal of approximately the length of the pan opening and about 1 inch narrower. They are fastened by means of two small hinges on each. When folded, they overlap and form a sort of lid or cover for the reflector. When opened, they control the distribution of light toward the sides as desired.

For portrait work, a floodlight of this type should be equipped with a diffuser. This can be a rectangle of draftsman's tracing cloth or any thin, white fabric. One way of supporting it, when hinged wings are used, is to hem the upper and lower edges of the cloth to receive lengths of stiff

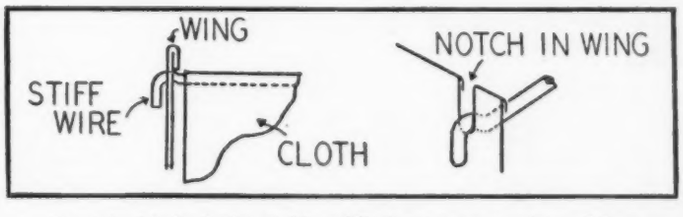



**Fig. 25. Method of attaching diffusing screen to wings of lamp.**

wire, and make notches or holes in the upper and lower edges of the wings, near the outer corners. The ends of the rods engage these notches or holes; and if the diffusing panel is the right length, it will exert enough tension to help keep the rods in place (Fig. 25).

If you plan to use a camera tripod as a lamp stand, bend the end of the free hinge leaf at right angles, along a line about ¾ inch from the tip. Either thread the hole with a ¼-20 tap, or ream it out and solder a ¼-20 nut over it, so the tripod screw will engage it.

## HANDY LAMP STANDS.

FOR supporting a spotlight or flood unit, a stand that can be moved about and that is adjustable with respect to height is a convenience, and may rank as a necessity when much indoor shooting is to be done. Inexpensive folding music stands are used widely, but these may not always be on hand or available. It is not difficult for the photographer to make his own lamp stands from either metal or wood.

The wooden stand shown in the photographs was made of oak, and is light enough to be carried about. It has folding legs for easy portability and storage, and will support a flood or spot unit of moderate weight.

All of the parts with the exception of the triangular piece at the bottom of the uprights are made from ¾- or ⅞-inch oak, ash, or other hardwood. For the uprights, cut three pieces to measure 9/16 inch thick and 30 inches long. The legs, of the same thickness, are each 18 inches long. The triangular piece is made preferably from ⅝- or ¾-inch plywood, but two pieces ⅜ inch thick can be glued together with the grains crossed, to provide almost the same resistance to splitting.

First cut an equilateral triangle measuring 4¾ inches on a

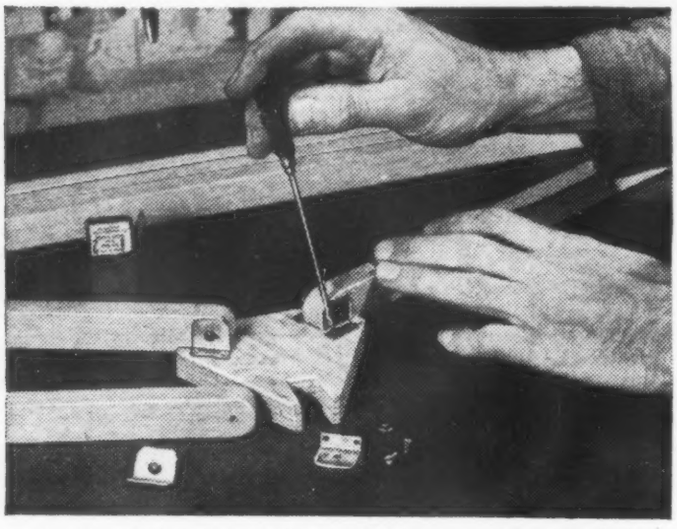


**Fig. 26. Folding legs of the portable lamp stand are attached to the triangular piece by means of small metal brackets.**

side, then cut off each corner along a line 1 inch from the apex and parallel to the opposite base. At each corner cut a rectangular notch to receive the upper end of a leg, each notch being the same dimensions as a cross-section of a leg. Round all edges and bevel slightly one end of each upright piece. Round the ends of the legs to a radius equal to half their widths; and at the center of curvature of one end of each leg, bore a hole to receive an 8-32 bolt.

From fairly stiff sheet metal, cut six L-shaped pieces to serve as brackets for the legs. Each piece is ¾ inch wide, 1 inch long before bending, and has about 5/16 inch bent at right angles to form the foot of the L. Drill two holes in this foot to receive small wood screws, and a hole in the main or upright portion for an 8-32 bolt. Bolt a pair of these brackets to each leg (Fig. 26). Insert the leg into a slot in the triangular piece and adjust it so the angle between the leg and triangle, as measured on the under side, is about 120 degrees. Insert the wood screws so the leg, when folded down against the back of the slot, will always remain at that angle (Fig. 27).

Insert a screw eye in the bottom edge of each leg at a point about 11 inches from the lower end. Tie a strong cord to one of the eyes, run it through the other two, and equip the free end with a hook that will engage the first eye. When this cord is taut, the legs will be held securely in an open position. By unhooking the cord, slipping the hook through one eye, and swinging the legs upward, you can fold the stand into a compact space (Fig. 29).

If you do not desire the folding feature but prefer greater rigidity, omit the L-shaped brackets and fasten the legs permanently in the slots with glue and nails. Then use a triangular piece of wood or three lengths of wood or metal to brace the legs, instead of the cord-and-screw-eye arrangement.

The uprights are assembled like a tripod leg. Fasten the lower ends of the two outer pieces to the triangular block by running two heavy wood screws upward through holes in the block, and into holes drilled in the ends. Be careful not to split the wood. Triangular wooden strips glued to the uprights and triangular block will make the joint stronger; or you can fasten metal right-angle braces in position with screws (Fig. 28).

The center upright should slide smoothly between the other two. Two rectangular pieces of metal fastened with screws to the lower end keep it from moving out of the slot. The

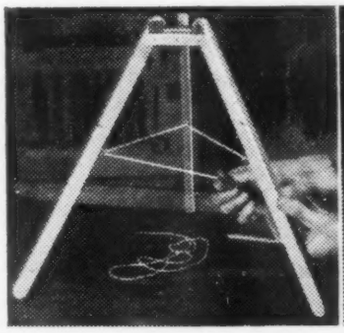


**Fig. 27. Legs are held open by cord passing through screw-eyes.**

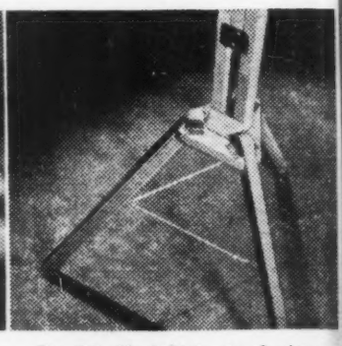


**Fig. 28. Upright is attached to base by blocks and wood screws.**

clamping device at the top keeps the upper end in line (Fig. 30). This clamping arrangement is exactly the same as that described for wooden tripod legs on page 105.

The upper end of the sliding upright is fitted to permit attaching the lamp unit. There are several ways of doing this. That shown in Fig. 30 consists of a brass angle brace fastened to the upright and drilled so a ¼-inch threaded bolt having a knurled head will pass through it and into a ¼-20 threaded hole in the bottom or mounting bracket of the lighting unit. In the case of the baking-pan floodlight, a hole was drilled in the projecting hinge leaf and tapped for the bolt. The hinge projects quite a bit, but serves as a convenient place on which to hang the lamp cord.

Finish the wood and metal parts of the light stand with lacquer or in any other manner desired. This unit may not be rugged enough for heavy spots and floods. By making the legs, uprights, and other parts more massive, you can increase its capacity to any degree.

For very heavy equipment you may prefer a metal stand. I have a spotlight stand made from an old rack originally designed for holding four barber's flexible-shaft clipper units. The base is a three-pronged iron spider and the upright a

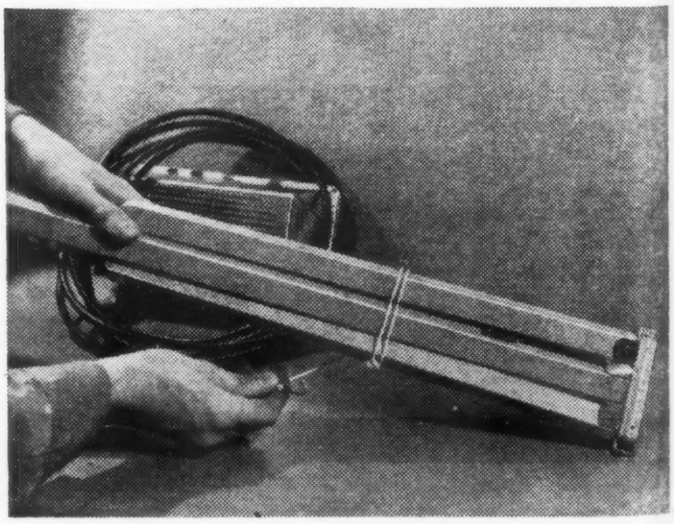


**Fig. 29. The portable lamp stand folds into a compact unit. Legs are tied together with cord which holds them when opened.**

length of iron pipe. Inside it slides a smaller pipe to which the spotlight is fastened, and which is locked in position by a ⅜-inch bolt, equipped with a small hand-wheel, that runs through a nut brazed over a hole a few inches from the top of the outer pipe. Such a stand is easy to duplicate. Simply obtain from your plumber two pieces of pipe, preferably galvanized, each about 42 inches long and one small enough to slide inside the other. Mount the larger one in a base that

can be an old automobile steering wheel, a heavy iron pulley wheel, or even a large disk of wood. Install a bolt-and-hand-wheel arrangement to lock the sliding pipe wherever you want it. Mount the lighting unit on the upper end of the small pipe.

**Boom Stand.***

The boom lights used in Hollywood and professional studios work as elaborately as microphone booms, extending for great distances and being capable of rise, fall, and swivel action as well. They enable the photographer to throw light just where he wants it, from the right angle to give the desired effect.

The much-desired toplighting of professional photography is economically available to the amateur via an adaptation of the Hollywood prototype. In addition to its use for dramatic effects and lighting of the hair, the boom light is also useful in full-length portraiture. Many other adaptations will suggest themselves.

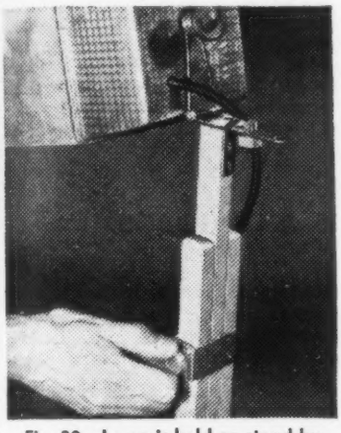


Fig. 30. Lamp is held on stand by angle bracket and thumb screw.

A boom light will eliminate much acrobatic work and difficulty for the amateur who has been trying to get toplighting effects with ordinary equipment. Its ease of construction and simple operation make it a likely accessory for the amateur. A few lengths of pipe, ordinary home work-shop tools and materials, a home-made or "boughten" spotlight, and a length of wire will produce a highly satisfactory boom light.

The boom light illustrated in Fig. 31 can be adapted to the individual amateur's specific requirements. A 6-foot standard and a 5-foot boom probably will suit average needs.

The standard and its three-legged base are made of iron pipe, the base rolling on casters. The standard should have a bottom opening for the wire to be carried up to the spotlight. That wire should have a plug at its lower end. Extension

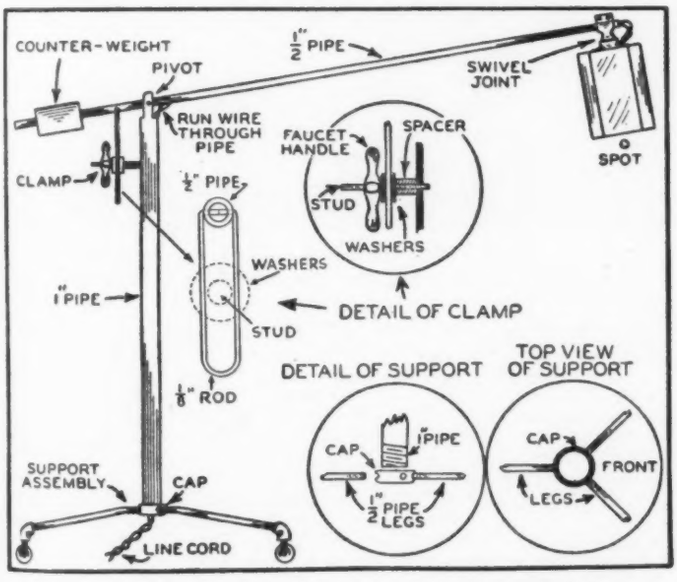



Fig. 31. Various details in the construction of boom light are shown here. Adapt the principles to materials you have on hand.

cables of varying lengths can then be plugged into the boom light from the wall outlet, quickly and easily.

The boom pipe is cut from ½-inch material. It fits into the pipe standard, which has been cut out to receive it. Be sure to cut down sufficiently to give the boom several feet of rise and fall on its pivot, which is best situated midway in the slot at the top of the standard pipe. The short end of the boom carries a counterweight for the spotlight.

A clamp arrangement, as indicated in the diagram, is attached to the short end of the boom, and provides a means of locking it in any desired position. When the clamp is released, the boom pipe will move freely up and down. Side swing is obtained by moving the whole lighting unit on its casters.

The spotlight should be hung on the boom tip so it may be adjusted for various angles as well as straight-down shooting. The wire to the spotlight must have enough slack to permit the boom to be swung to its extreme limits.

## SERIES-PARALLEL CONTROL UNIT.

THE wear and tear on photoflood lamps, spotlights using 500-watt bulbs, and similar high-intensity incandescent lamps can be reduced by burning them in series while focusing the camera and arranging the lighting. When two or more

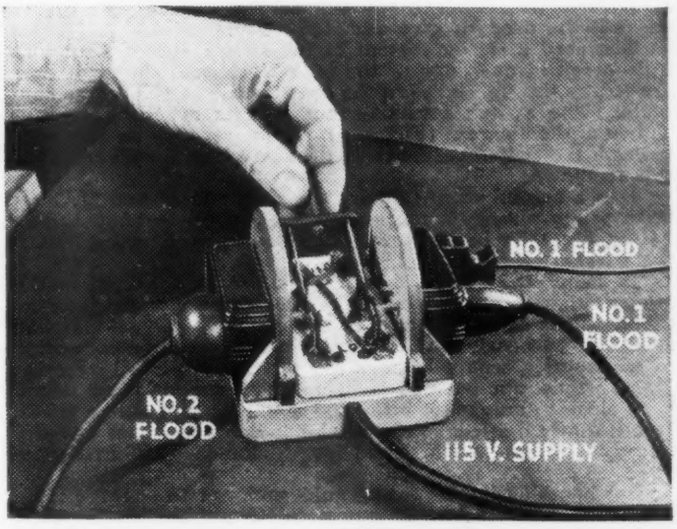



Fig. 32. Compact series-parallel control unit provides guard for the exposed knife-switch blades.

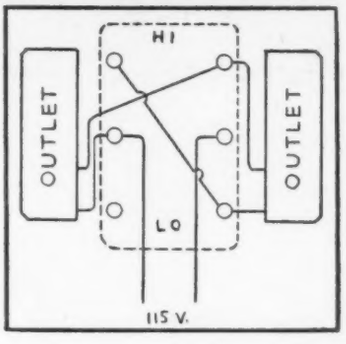



Fig. 32A. Wiring diagram for the control switch. Series position is "LO," parallel position "HI."

lamps are burned in series instead of the usual parallel arrangement, the amount of current passing through each lamp filament is considerably less than normal. Consequently the filament lasts a much longer time, and the glass bulb does not blacken as rapidly as in normal burning.

If lamps are in series when first turned on and then are switched to full brilliancy, the filaments and other lamp parts are heated gradually instead of all at once. Cold spotlight lenses are sometimes broken by turning the lamp on to full brilliancy. If it is burned for a minute or two at reduced brilliancy, the lens is heated more slowly and no breakage occurs.

Switching lamps from series to parallel and back again is accomplished with the help of a special switching unit that any photographer can assemble. Such a unit can be operated with three single-pole snap switches (such as the familiar wall toggle type or smaller canopy toggle switches), two three-way switches, or a double-pole, double-throw knife switch of the type illustrated.

Suitable knife switches are usually obtainable at local electrical and hardware stores. The switch shown in Fig. 32 cost 29 cents. In purchasing a switch, select one that has a fairly long, detachable handle, if possible. Some have porcelain handles that are a bit short. You may want to remove the original handle and substitute one that is longer; and this is more difficult if the material is porcelain. In addition to the

* Designed by Alex Evelove, Beverly Hills, Calif.

switch, obtain two surface-mounting duplex outlets, some lamp-fixture or similar insulated wire for making connections, and about 10 feet of heavy-duty extension cord, this to be fitted with a standard plug.

Mount the switch on a wooden block and install two curved pieces of ¼-inch plywood or similar material to serve as guards and as surfaces on which to fasten the outlets. The exact dimensions of the base will depend on the size of the switch base and the outlets. The curved pieces are cut to a radius corresponding to the swing of the switch blades and the handle, and are of such size that the curved edges are about even with the cross-bar that connects the ends of the blades. Thus they serve as guards to prevent accidental touching of the live switch parts. Further protection can be provided by curving two strips of fiber or sheet metal around the guards, leaving a slot for the switch handle.

The unit illustrated has four triangular blocks that serve as braces for the curved pieces. There is a more rigid way of mounting the guards, and that is to glue them in grooves cut into the base. These grooves should be at least ¼ inch deep for a base-block ¾ inch thick. The triangular blocks can still be used to give added rigidity.

The cord carrying current to the switch enters through a hole bored in one edge of the base-block, and the two wires are led up through holes in the switch base to the center contacts. The switch terminals and outlets are connected as shown in the diagram (Fig. 32A). The wires may be concealed beneath the switch base, but it is easier to run them across the top as shown.

It is a helpful stunt to paint the words "HI" and "LO" at appropriate places on the switch, so you can set the handle before plugging in the unit. (The series position is "LO," the parallel position, "HI.")

In using the switch, best results are obtained when the lamps plugged into one outlet balance those plugged into the other. That is, the wattage of the lamps should be matched as closely as possible. Thus two No. 2 floods, one connected to each outlet, would balance perfectly. One No. 1 and one No. 2 would not balance well, and the smaller lamp would burn close to maximum brilliancy while the larger one would be but dimly lighted. Two No. 1 floodlamps balance one No. 2 fairly well; and a No. 1 and No. 2 balance a 750-watt spotlight.

For handling large lighting units such as two or more 1500-watt floodlights, the switch and wiring should be heavier than that shown.

Such series-parallel switches are intended for use with incandescent types of lamps, and not with fluorescents or other kinds requiring a definite voltage to make them work at all.

## REFLECTORS AID LIGHTING.

IN MAKING outdoor portraits and similar pictures, a reflector is often needed to throw light into the shadow portions of the subject. In making indoor pictures by artificial light, it can be put to the same use, and pays a dividend by eliminating the necessity of using an additional light source.

This useful adjunct to photography consists simply of a flat surface painted white. Often a piece of ¼-inch plywood, say one measuring 24x 36 inches, is used. When portability is not a deciding factor, this does perfectly. After rounding the corners and smoothing the edges with sandpaper, give the reflecting surface two coats of white water-mixed casein paint or flat-white oil paint. White casein paint reflects a higher percentage of light than almost any other available material, including metal foil.

When a single piece of plywood proves to be too clumsy to carry around, you can saw it into smaller sections and connect them with hinges. One arrangement is to make two cuts across the shorter dimension, to divide the sheet into three pieces of equal size. Use small, light-weight strap hinges to join the sections, and bend the hinge leaves to fit around the edges of the wood; or you can use simple strips of leather or heavy fabric run the entire length of each joint. It does not matter if there is a crack between the sections when the reflector is opened. The most compact arrangement is to hinge the pieces so the reflector assumes the form of the letter "Z" when partly folded. One white surface will be exposed, and should be protected when being carried or stored. A four-section board can be folded so the white area is wholly covered.

Instead of plywood, you can use stiff cardboard for making a reflector. Cloth-strip hinges are suitable for it. Still another way to make a compact reflector is to roll a piece of white cloth on a window-shade roller, or use a shade that either was white originally or has been painted. The chief drawback is that, being rather flabby, such a reflector does not behave very well in even a moderate breeze.

A reflector must be supported at the proper angle and height to do the work expected of it. If you have enough assistants, have one of them hold it. You can mount a screen door handle or drawer pull on the back of a one-piece wooden reflector, so it can be held securely. If the reflector is a folding type of wood or cardboard, cut a strip of wood to extend across all the sections, bore it to receive small bolts that extend also through holes in the reflector sections, and mount the handle on it.

The best arrangement is to support the reflector on a camera tripod or on a stand of its own. For outdoor work, an inexpensive, folding artist's easel will do. Simply lean the reflector against it (or a tripod leg) for ground-level reflecting, and rest it on the easel crossbar for a higher position. The wooden lighting-unit stand, described on page 114, can be used as a reflector support. Whatever the method of holding, your reflector probably will be blown over more than once by the wind. Besides, the white surface soils easily. So, to maintain its efficiency, keep a can of white paint on hand for renewing it occasionally.

## BACKGROUNDS AND GOBOS.

ORNATE backgrounds consisting of sheets of canvas on which were painted Greek temples or woodland scenes passed out of the picture along with the mustache cup. Today, a photographer can get along with only two plain backgrounds, if he needs any at all. One of these is colored dark gray or black, and the other light gray or buff.

**Fig. 33. Window blind, fastened in a simple wooden box open at the bottom, makes a compact, portable background for home use.**

Probably the most compact backgrounds of this sort consist of wide window blinds suspended from rollers mounted on a wall or low ceiling. A simple wooden box, open at the bottom, can be made from ¾-inch material to enclose the rollers and keep out dirt when the blinds are not in use (Fig. 33). Usually the two blinds, one light and one dark, are mounted together so that either one can be pulled down as desired. When such a blind becomes soiled, it can be refinished with window-blind paint of appropriate color.

Any flat surface can serve as a background. Sheets of building board ¼ to ½ inch thick are excellent. These usually are obtainable in 4-foot widths, and in lengths up to 12 feet. Often the material has a distinctive texture that is desirable. By pasting wallpaper on such a sheet, still greater variety is obtainable. Wallpaper that looks like pine paneling, oak paneling, and so on is obtainable. Wall paint can be used to refinish a background made of building board, but care should be taken to apply it smooth unless brush texture is desired. The paint should, of course, dry to a no-gloss finish.

Photographers who do portrait work often use accessories or props consisting of simple geometric shapes: cylinders, cubes, and so on. These can be built from wall board glued or nailed to wooden frames, and painted flat white, buff, gray, or

any other desired color. Surface irregularities such as holes left by nail heads should be filled with crack filler and made smooth before painting.

Miniature backgrounds consisting of relatively small sheets of building board are useful when making tabletop pictures, shop photographs, and outdoor shots of flowers and small plants. These are really masks to cover up unwanted detail. They can be mounted on small lamp stands or provided with their own supports in the form of pegs that can be pushed into the ground, or handles that can be clamped to various objects.

A rectangle or other shape of building board, cardboard, or any opaque material mounted on a lamp stand so it can be adjusted to various positions forms a useful studio gadget commonly known as a **gobo.** Strictly speaking, a gobo is a screen used to shield a camera lens against stray light; but it also is useful for controlling the distribution of light over a subject. Thus a small gobo might be adjusted in the beam of a spotlight to keep light from hitting a portrait subject's nose while backlighting the hair. Semi-transparent material such as thin cloth supported by a hoop can be used to reduce light without shutting it off completely.

There are several ways of mounting small sheets of building board so they can be adjusted to various positions for background or gobo service. One of the most convenient is to run a ¾ x 1 inch strip of wood across the back and fasten a small ball-and-socket tripod head to it, the head in turn being attached to a tripod or the top of a lamp stand. It is convenient to arrange so the head can be fastened either to the center of the strip or near one end. A rectangle or disk of stiff sheet metal such as ⅛-inch brass, drilled and threaded to take a ¼-20 bolt and fastened to the wood strip, with screws, forms a practical arrangement for attaching the ball-and-socket head.

A convenient type of gobo can be made as follows: A piece of black cloth is stretched over a frame made of stiff wire. Near one corner of frame, a ¼-20 nut is brazed, so the gobo can be attached to a ball-and-socket tripod head for adjustment to any angle. This same construction can be used for making a light reflector, the black cloth being replaced by a white one.

When photographing small objects at or near life size, the background may prove to be somewhat of a problem. Usually a sheet of blotter paper or something else that has practically no texture is desirable. When the objects are laid directly on such a background, the texture is reproduced sharply, and shadows are usually prominent. A way of eliminating both the shadows and the texture while still retaining the tone of the background is to support the objects on a sheet of glass that is raised several inches above the background. Care should be taken to avoid reflections from the glass surface into the lens.

## VERSATILE CONTACT PRINTER.

ALTHOUGH it looks much like any garden-variety of printing box, the contact printer shown in the illustrations possesses some special virtues that set it apart and make it highly versatile. The model shown is somewhat bigger than the average amateur printer, because it was constructed to take any paper size up to that of a standard typewriter sheet, 8½ x 11 inches. That permits it to be used for direct copying of letters on special copy paper. Although dimensions given are for a printer of this capacity, you can reduce them proportionately and still retain the essential features.

The printer consists basically of a wooden box containing four white-bulb lamps and one red-bulb lamp, a glass top for the box, a platen arrangement for holding paper and negative against the glass, an automatic switch for operating the white lamps, and a groundglass diffusing screen that also can be used for controlling prints by dodging (Fig. 34).

### The Box.

The box can be an empty wooden store box, or it can be built of any convenient lumber or pressed composition wood. The bottom and two ends are made from ¾-inch stock, and the sides from ¼-inch plywood. Outside dimensions are: width, 10¼ to 11 inches; length, 13½ inches; height, 10½ inches. From strips of wood measuring ¾ x 1⅛ inches, and rabbeted to form a groove, make a frame to fit on the open top of the box. The inside of the frame should measure 8¾ x 11¼ inches. The rabbet forms a ledge to support the glass, and extends ¼ inch in from inside edges and ½ inch down from the top when the frame is in position.

Before assembling the box and frame permanently, construct, on one side of the box, a door that can be opened downward to provide access to the groundglass diffusing screen. This door, which extends entirely across the box just beneath the top frame, measures 2¾ x 13½ inches. It is joined to the remainder of the side panel by two small hinges,

Fig. 34. Wooden arm raises and lowers platen on printing box.

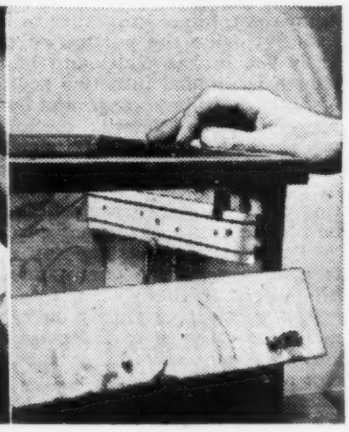


Fig. 35. Grooved strips at each end of box support groundglass.

has a knob at the center near the top edge, and is held shut by two friction cabinet-door catches, one at each end.

### Diffusing Screen.

The groundglass diffusing and dodging screen is supported by two grooved strips of wood extending across the inside

Fig. 36. Wires from lamps are soldered to platen-arm switch; dowel-rod push-button can be seen in the top frame, right.

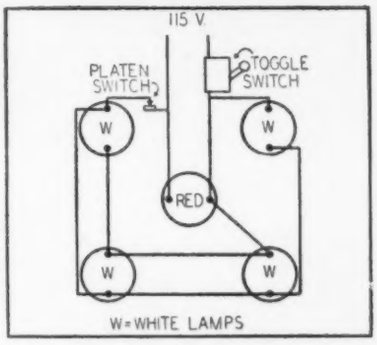



Fig. 37. Wiring diagram for the contact printer shows how to connect the five lamp sockets and two light-control switches.

surfaces of the end pieces. These strips are about ½ inch thick and 1½ inches wide. Two grooves ⅛ inch wide and ¼ inch deep are cut lengthwise, each about ¼ inch from an edge, to receive the edges of the groundglass (Fig. 35). When the glass is in the upper set of grooves, distance between it and the clear glass in the top frame is about 1½ inches. With the groundglass in the lower grooves, the separation is about 2⅜ inches (the groundglass being ⅛ inch thick). By pro-

viding two positions for the diffusing glass, variation in the effect of dodging masks is obtained, as described later.

**Platen Assembly.**

The platen consists of two pieces of ⅜-inch plywood or equivalent, hinged together to form a piece that fits somewhat loosely inside the portion of the frame above the top glass. It is 9⅛ inches wide, and has a total length of 11⅝. The length is divided into two sections, one 4¼ inches, the other 7⅜ inches. They are joined by two small butt hinges. Along the edge of the smaller section, the platen is fastened to the top frame by two similar butt hinges. Cover the bottom surface of the platen with a layer of soft felt or similar material, to produce even pressure over the glass. The thickness of this pad will determine whether or not the end hinges must be blocked up by strips of cardboard or wood.

Extending across the top of the printer is an arm made from a piece of wood measuring ¾ x 1¾ x 17 inches. At the hinge-end of the platen, this wooden piece is attached, by means of a rather sturdy butt or T hinge, to a block of wood nailed or screwed to the end of the box. The block projects about ½ inch above the surface of the top frame. At the other end of the arm, mount a small knob made of glass, wood, or other material, to serve as a convenient handle.

When this arm is in a closed position, it exerts pressure on the platen and also closes the lamp-control contacts. In the printer illustrated, pressure between arm and platen is achieved by two curved spring units made from an old phonograph-motor spring. There are four 1¼ x 8-inch spring sections, mounted in pairs so their ends press against the platen sections midway between the longer edges of those sections. Sheet-metal plates tacked to the platen top prevent the springs from digging into the wood.

To mount the springs to the arm, make holes in the centers of the spring strips, and use wood screws. Since a spring of this sort is extremely hard, you will not find it easy to drill the holes, but must punch them instead. Use a sharp-pointed punch and rest the spring over a small hole in a metal block. The punch will form a projection where its point forced the spring into the hole. Remove this projection with a grinding wheel to form a hole in the spring.

Another way of transferring pressure from the arm to the platen sections is to mount two short pieces of rubber garden hose across the platen at right angles to the arm. The hose pieces are placed in the same positions as the spring strips. Distance between platen and arm must be such that the hose is flattened slightly when the arm is held down.

**Electrical System.**

For the electrical system you will need five surface-mounting porcelain or plastic sockets, a few feet of rubber-covered lamp cord with a pronged plug, a small canopy switch (the kind used in floor and table lamps), some miscellaneous lengths of flexible wire, and a few small pieces of springy bronze weather stripping material.

Mount one socket in the center of the box bottom and the other four in a rectangle around it (Fig. 36). Measured from center to center of the sockets, this rectangle is 4½ x 6 inches. Mount the canopy switch in the side of the box at some convenient point, and connect it in series with one side of the power-input cord. Wire the four other sockets in parallel, and run one of the feed wires through a switching mechanism operated by the platen arm (Fig. 37).

This mechanism is constructed from the springy bronze weather stripping material and a length of ¼-inch wooden dowel. Bore a hole about 9/32 inch in diameter vertically through the top frame and end piece of the box, at a point directly beneath the center of the platen arm where its knob end swings down. Make this hole deep enough to pass about 1 inch below the groundglass support. With a narrow chisel, cut through the inside surface of the end piece into this hole, and clean out the wood to the full width of the 1-inch section below the support.

Cut and bend two strips of the spring bronze and mount them as shown in Fig. 38. Note that both strips extend into the hole, and that the upper one supports the end of the dowel rod. If it is not stiff enough to hold the rod up, reinforce it with another strip of the bronze. Run a wire from one of the bronze pieces to one side of the white-bulb circuit, and a wire from the other one to the source of power. The wood acts as an insulator for the switch elements; and since the entire switch is enclosed, that is normally safe enough. Of course, you can mount a momentary-contact (push-button) switch inside the box where the dowel rod can operate it, if you want a more professional arrangement. Normally, 25-watt lamps are about right for the four outer sockets. If you are making a number of prints from a negative that has one or more thin corners, you can use smaller lamps in some of the sockets. Use a 10-watt ruby lamp in the center socket.

Finish the box with lacquer or enamel of appropriate color. Don't be afraid to make it a bit gay: bright colors help cheer up a darkroom and improve visibility.

The groundglass diffusing screen is employed in dodging as follows: Wherever there is a thin place in the negative that prints too dark, cut a piece of tissue paper approximately the same shape as the thin area and slightly larger, and lay it on the groundglass at a point directly beneath the area (Fig. 39). Experiment until you find a piece of paper of the proper size and translucency to control the exposure desired. In a similar way, you can lay a vignetting mask on the glass, and obtain prints with white borders that shade gradually into the full tones of the image. Various other effects can be achieved with paper cutouts.

With a soft pencil you can make shaded areas on the ground surface of the glass to hold back the light over thin areas of the negative. You can open the door in the box side and introduce a dodging mask —such as a disk of red celluloid or cardboard on a wire handle —to darken or lighten portions of the picture. However, the difficulty of seeing just where you are holding back the light makes this stunt somewhat impractical. Masks supported by the diffusing glass are better.

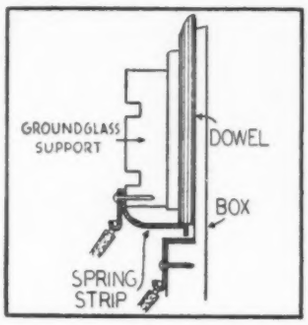



**Fig. 38. White-light switch operated by the platen arm.**

In case you do not have a groundglass diffusing and dodging screen for the printer, you can make your own from a piece of window glass. Obtain some abrasive powder such as No. 150 aluminum oxide or silicon carbide grains, put about one-fourth teaspoonful on the glass as it rests on a firm surface, add a little water, and scour the glass with a block of steel or the bottom of a small bottle. The abrasive grains cut away the glass surface, producing the characteristic ground finish. It takes about 15 minutes to grind a 9 x 11½-inch glass like that illustrated. You can use the same process to produce groundglass focusing screens for cameras and diffusers for enlargers.

There are other conveniences, not illustrated in the photos, that can be built into this printing box. You may, for example, cut a hole of any convenient size in one side of the box and install over it an orange safelight screen. The printer thus becomes a safelight lamp for illuminating your developer tray. The red pilot lamp in the box will provide enough illumination for ordinary purposes: it normally burns continuously during the work period.

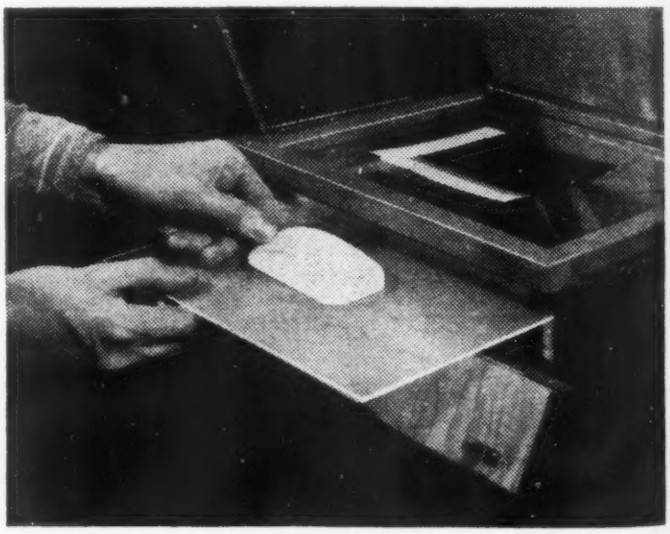


**Fig. 39. Dodging is accomplished by placing pieces of paper on the groundglass diffusing screen for a portion of the exposure.**

By installing a second switch to short-circuit the dowel-rod switch that controls the printing lamps, you can turn on the white light and use the box, with the platen raised, as a

retouching or negative-inspecting stand. With the same arrangement, the box functions as an illuminator for color slides or other transparencies being copied by a camera.

To copy letters, newspaper clippings, book pages, etc., you can purchase special paper (orthochromatic or panchromatic) that has a high contrast, and is treated so it can be handled in subdued white light. Letters typed on only one side are placed against the paper and printed like they were ordinary negatives. If the typed side is against the paper, a reversed image is obtained, and can be used for making duplicate copies. For letters and other material printed on both sides of the sheet, the reflective method is used. Place the printing and sensitized surface of the copy paper in contact, but with the sensitized paper **between** the copy material and the light. That is, the printing light passes through the sensitized paper before it reaches the printing. Selective reflection produces the image which, to make positives, is again printed like any negative.

## BUILDING AN ENLARGER.

IN THE long procession of equipment that photographers plan to build, an enlarger leads the parade. This desire is quite understandable, for anyone who has compared a small print with an enlarged duplicate will recognize the increased value and appeal of the bigger picture. An enlarger can be surprisingly simple and still produce excellent enlargements. On the other hand, it can be very intricate. Because of this considerable range of possible forms, a design has been worked out for an enlarger that can take any of three degrees of complexity.

Before going into the construction, you should consider a few principles of enlarging or projection printing. Basically, an enlarger is a camera working in reverse. The action is very much like that which would take place if the image of a house, after materializing on a camera film, turned around and jumped back out through the lens, to re-form as an image on a plane closer to the camera than the original house. The essential parts of an enlarger consist of (1) a source of light to illuminate the negative held in (2) the negative carrier, and (3) a lens to form an image on (4) the easel on which is placed light-sensitive paper.

The exact quality and degree of sharpness of the image depends largely on the excellence of the enlarger lens; but these things also are influenced by the type of illumination. Enlargers can be classified into three groups on the basis of illumination:

1. **Simple diffusion type,** which is the least costly to build and capable of very excellent results, particularly with portraits and pictorial subjects. Light generated by a lamp passes through a piece of flashed opal or groundglass, and in doing so is highly diffused. That is, light rays that formerly were traveling more or less in the same direction are scattered in all directions. Many of them get lost, but a usable proportion reach the negative and illuminate it. The enlarger lens forms an image of the illuminated negative on the easel. This type of illumination minimizes negative grain and minor surface scratches.

2. **Condenser-diffusion type.** The lamp has a bulb of opal or frosted glass, and instead of a diffusing screen there is a large positive lens or system of lenses called the condenser. This lens acts to spread the image of the bulb uniformly over the negative, and the projection lens does the rest. Enlargers of this type are faster than those in group 1, and produce somewhat snappier prints. Grain and scratches are still subdued enough to satisfy most conditions.

3. **Converging-beam condenser type.** The construction is fundamentally the same as for group 2, but the lamp has a clear bulb and a concentrated filament that acts as a point source of light. Rays emerging from the lamp in a cone strike the condenser lens and are bent back into another cone in such a way that the image of the lamp filament is formed in the enlarger lens. Whenever the position of the enlarger lens is changed appreciably, the lamp has to be moved forward or back, to keep the image in the lens. Although the converging-beam condenser enlarger produces maximum contrast and sharpness in a print, it also shows up all the grain and blemishes. Since many photographers fail to make perfect negatives, and do not like to adjust any more things on an enlarger than they can avoid, the straight condenser enlarger is not overly popular in amateur circles.

Most of the illustrations in this book were made from 3¼ x 4¼ negatives projection-printed with a converging-beam condenser enlarger altered to make it a condenser-diffusion type.

The building of an enlarger is not as difficult as it might first appear to the uninitiated. It is surprising how extensively the builder can make use of common materials and articles—empty tin cans, for example. Wood can be used for such parts as negative carriers, but should not be used where it will become greatly heated by the lamp, or in places where the atmosphere is habitually damp. Most darkroom conditions tend to promote rusting of iron and steel, so the metal parts of an enlarger should be made, as far as possible, from

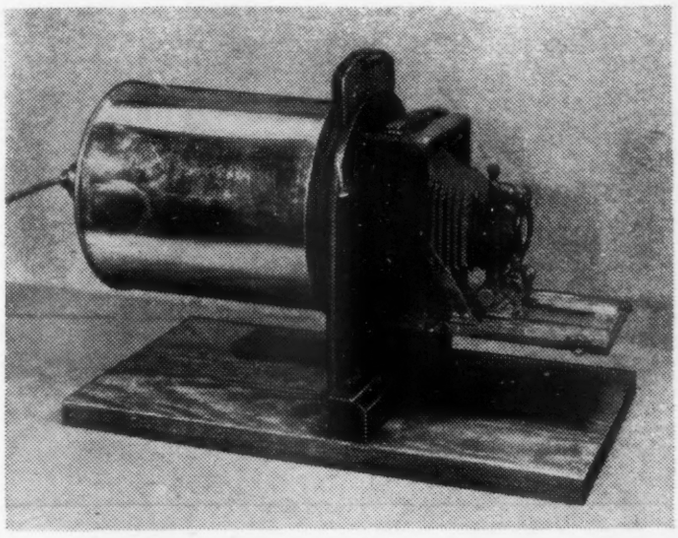


**Fig. 40. This horizontal enlarger is nothing more than a focusing-type camera attached to a lamphouse and negative carrier.**

non-rusting materials. Brass is excellent for such parts as focusing-knob shafts, focusing tracks, rack-and-pinion arrangements, and bolts and screws. It can be chromium-plated or otherwise attractively finished.

From a tinner who does industrial work, you may be able to obtain scraps of monel metal that can be worked into various parts. It is tough stuff, and requires much more force to cut with shears than brass or even iron of equal thickness. When drilling it, use turpentine, kerosene, or a sulfurized cutting oil as a lubricant for the drill bit. Aluminum is another excellent material for building enlargers and other photo equipment. Its chief drawback is that it cannot be soldered easily. Industrial research has developed new and better materials, such as various kinds of plastics. A plastic knob, for instance, is better for damp hands to handle on a cold day than a metal one.

Usually the best light source is an electric lamp designed for enlarger use. Floodlamps generally should be avoided because of their tremendous heat output, even though they are faster than more conventional lamps. A 100-watt opal-bulb lamp should be ample for lenses working at *f* 8 or faster. In a well-built enlarger, it is not necessary to stop the lens down very much. The negative is flat, and any increase in depth of field is of no advantage—provided, of course, the lens is well enough corrected to focus a flat field sharply. For the enlargers described, use a regular white-bulb enlarging lamp.

### Part I.

### Simple Horizontal Enlarger.

In its simplest form, the "three-step" enlarger to be described is essentially a lamphouse unit to which is attached a focusing camera (Fig. 40). It operates in a horizontal position, projecting the image on a wall or vertical easel. If a vertical enlarger of somewhat more involved design is desired, the lamphouse is mounted on an upright column, provided with an improved ventilating system, and perhaps equipped with a condenser lens instead of a simple light-diffusing glass. In its final form the enlarger is still a vertical type, but instead of an attached camera it has a focusing mechanism and permanent lens. The photographs show an enlarger handling 3¼ x 4¼ inch negatives, but the same design can be used for any size, from a miniature up.

In scaling down the dimensions given to make a miniature enlarger, you can reduce the lamphouse diameter to about 3 inches, which is sufficient to take a 100-watt lamp. However, it is a good idea to keep the lamphouse as large as practicable,

to reduce the tendency to overheat. The bellows or other enclosure between lens and negative carrier of a miniature enlarger should be no less than 1¾ inches square at the negative end; or if round, 2 inches minimum in diameter.

For the simplest form of enlarger, you will need, first of all, a camera. Any focusing model whose back can be removed so light will pass straight through it will do. The illustrations show a unit built to accommodate a 3¼ x 4¼-inch camera of uncertain origin having a wooden body and conventional rack-and-pinion focusing arrangement. If your camera is somewhat smaller or larger, you simply vary the dimensions of negative carrier and openings through which light passes from

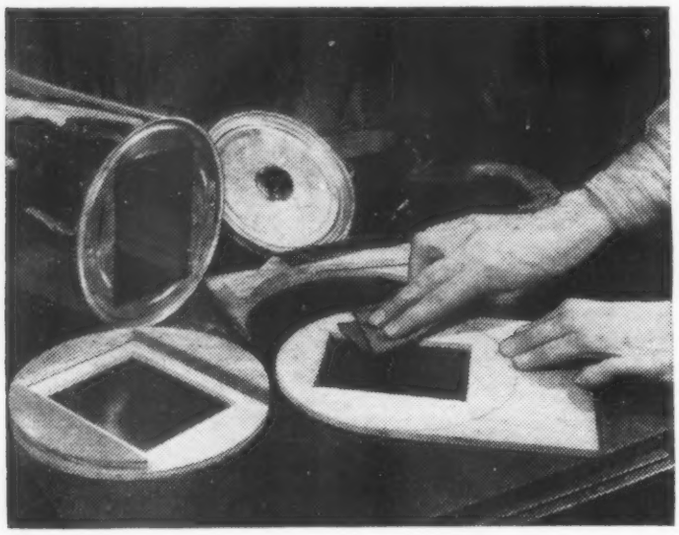


**Fig. 41. Three plywood pieces form main enlarger support and negative-holder recess. The vertical upright is being sanded.**

the lamphouse. If there is considerable variation from the 3¼ x 4¼-inch size, you will use a larger or smaller lamphouse. This should be at least 2 inches greater in diameter than the diagonal of the largest negative to be handled.

The lamphouse in the model shown was made from a gallon bucket having a tight-fitting lid. It measures 6⅝ inches in diameter and 7½ inches long. To duplicate this enlarger, secure such a bucket, and in the center of the lid cut a hole about ¼ inch less in diameter than the threaded shell of a brass lamp socket. Make a number of slots around the hole with tin snips and bend the resulting lugs back so the socket shell can be forced into the hole. Solder the shell to the lid at several points.

In the bottom of the bucket, centered with respect to the circumference, cut a rectangular opening about ⅛ inch larger all around than the largest negative to be projected. In cutting this opening, it is a good idea to place it so the seam in the side of the bucket will be in a downward position when the enlarger is finally assembled.

The lamphouse is fastened to two wooden disks, cut slightly larger than the bottom of the lamphouse, which are in turn mounted on an upright made of ¼-inch plywood or similar material. The disk nearer the lamphouse is a piece of ¼-inch plywood having an opening corresponding to that in the bucket bottom. Next is a disk of ⅜-inch plywood from which a rectangular section 4⅜ inches wide and 6⅜ inches long, measured along the diameter of the disk, has been cut to form a recess into which the negative carrier can be slipped. The upright is a piece of ¼-inch plywood 7 inches wide and 9½ inches long, with one end rounded to coincide with the curvature of the two disks. It, too, has a rectangular opening the same size as those in the bucket bottom and the first disk (Fig. 41).

Fasten the two disks permanently together with glue and small nails. Use four wood screws extending into the ⅜-inch section to fasten these to the upright. Place a layer of craft paper between disks and upright before inserting the screws. This provides clearance for the ⅜-inch negative carrier, which is cut from plywood. You can assemble the two disks and the upright piece so the negative-carrier slot opening is at the top or side of the enlarger. In the model shown, it is at the top because the camera for which the enlarger was designed works better in a vertical position.

The base of the enlarger consists of a board measuring ⅞ x 8¼ x 16 inches. A 1⅛ x 1⅛ x 8 inch strip extending across it provides a means of attaching the upright. Distance from the front end of the base to the upright is 7¼ inches. Three screws are used to secure the upright to the crosspiece (Fig. 42).

The method of attaching the camera over the opening in the upright will depend on the design of the camera. The one shown was arranged to take standard film holders of a type used in a leading make of reflex camera, and so two strips, grooved and otherwise shaped to duplicate the edges of such a holder, were fastened with nails and glue along the vertical edges of the opening. A block mounted horizontally below them acts as a rest for the camera, to prevent it from sliding endwise.

Sometimes the easiest way of fastening the camera is to mount two flat strips of metal, with ends bent around to form hooks, on the side of the wooden section. These strips are slotted so they can move endwise an inch or two. The hooks engage the edges of the camera box and, when the strips are pulled back and secured with wing nuts operating on threaded studs extending from the wood, hold the camera firmly. Still another way is to drive a few roundhead screws or nails into the edges of the disks, and loop stout cord or rubber bands around them and the camera. Whatever the method of fastening, the camera should line up squarely with the openings in the lamphouse and wooden members, and its lens should be in line with the center or axis of the lamphouse.

By simply placing a lamp in the socket, you cannot obtain even illumination over all the negative. Some sort of diffusing device must be placed between the lamp and the negative. One common material is white flashed-opal glass; another is groundglass. Of the two, the opal glass diffuses the light better but absorbs a considerable portion of it. Ordinary groundglass does not provide complete diffusion, but transmits more light. On the whole, opal glass is preferable. However, with some abrasive powder and water, you can make your own groundglass (as described on page 118), and grind it more in the center than toward the edges. By trial and error, you can produce a diffusing glass that will even out the light satisfactorily.

The best position for either an opal or groundglass diffusing screen is about 1 inch back of the negative. However, when opal glass is used, it can be placed between the bottom of the bucket or can forming the lamphouse, and the wooden disk. The white or flashed side, as seen by looking at an edge, should be toward the lamp. Thus the distance from the diffusing surface to the negative is about ½ inch. This is satisfactory as long as the glass is kept clean. Otherwise,

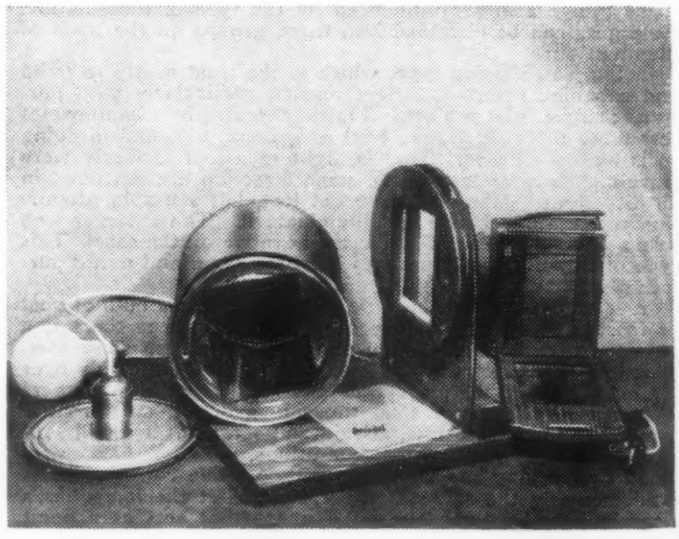


**Fig. 42. Parts of enlarger; l. to r., lamp and socket, lamphouse, groundglass, base and upright support, negative carrier, camera.**

dirt and scratches on the glass may be picked up by the lens and recorded in the print. Always place a groundglass diffuser at least 1 inch from the negative.

The negative carrier is fashioned from two pieces of plywood 7½ inches long and wide enough to slide snugly into the recess in the wood section. One piece is ¼ inch thick, the other ⅛ inch. Slide the ¼-inch piece into the negative-carrier recess, and with a pencil or scriber mark the corners of the rectangular opening in the upright. Using these marks as reference points, lay out a rectangle slightly larger than a 3¼ x 4¼-inch negative—say 1/32 inch all around. The center of this rectangle should be in line with the centers of the other

openings through which light passes. Cut out the rectangle. Now do the same thing with the ⅛-inch piece, only make the opening **smaller** than a 3¼ x 4¼-inch negative. About 3/32 inch all around is a satisfactory margin. Glue the two pieces of wood together to form a negative-holder ⅜ inch thick, with a recessed opening into which a negative can be laid.

There are several ways of holding the negative. One of the simplest is a glassless method: From fairly stiff, springy wire, make a rectangular frame that can be sprung without a great deal of effort into the negative recess. Braze or hard-solder the ends of the wire together, and smooth any projections with a file. This frame, when pushed into the opening after a negative, holds the film flat enough for all practical purposes. Another way of holding a film is to make, from sheet metal, a frame that fits in the negative opening and is held by small metal turn-buttons or other fastening device. When such a frame is used, it usually measures at least ¼ inch all around larger than the opening in it; so the opening in the ¼-inch portion of the wooden piece must be enlarged accordingly.

A third negative-holding system uses two pieces of glass, with the negative sandwiched between. The glass is held in the wooden frame by turn-buttons or spring fasteners. Glass has the advantage of holding film reasonably flat, but there are three counts against it: 1, it collects dust and finger marks; 2, it holds heat which, especially with diffusion enlargers using ground or opal glass and requiring relatively long exposures, may permanently warp the film base; 3, by making varying contact with portions of the film, glass may form Newton's rings, which appear on the print as alternate light and dark bands forming irregular or circular patterns. The glassless method of holding negatives possesses none of these disadvantages, but may not hold the film perfectly flat. However, if the lens is stopped down to, say, *f* 11, the depth of focus is enough to overcome normal irregularities. Most of the photographs in these articles on gadget building were enlarged with the negative clamped in a glassless holder.

Wooden parts of the enlarger can be finished by staining, followed by application of clear lacquer or varnish, or by applying colored enamel, lacquer, or oil paint. The lamphouse can be left unfinished if it is in good shape, or can be coated with heat-resisting or baking enamel. The inside of the lamphouse usually can be left as is. If you do cover it, use aluminum or white paint.

The enlarger shown has no ventilating openings in the lamphouse. If a lamp no larger than the 100-watt size is used, and care is taken not to leave it on very long at a time, the lamphouse will remain reasonably cool. However, it is advisable to make ventilating holes and install baffle strips as described for a spotlight, page 111.

With the enlarger shown, using a 100-watt opal-bulb lamp and the lens set at an aperture of *f* 8, a portion of a 3¼ x 4¼ negative was enlarged to 8 x 10 inches on normal-speed bromide paper in 20 seconds.

## Part II.

## Simple Vertical Enlarger.

Using the same basic illuminator unit, you can construct a vertical enlarger to which a camera having focusing controls is attached. The chief advantage of the vertical over the horizontal model is that less table space is required. Also, some photographers find it easier to dodge and otherwise handle sensitized paper on the horizontal easel used with a vertical enlarger.

The base of the enlarger can be any large rectangular piece of wood; ¾-inch plywood is ideal. The base shown in Fig. 43 consists of several ¾-inch boards joined at the edges and reinforced by two cross pieces or cleats measuring ¾ by 1½ inches. The top measures about 18 x 20 inches.

The upright, about 1½ inches in diameter and at least 24 inches long, can be any tubular piece of steel or brass. An ordinary length of pipe of that size, either black or galvanized, will do nicely. The lower end is fastened to the base by means of a standard floor flange.

The arm that slides on the upright and supports the enlarger head is made as follows: From a piece of wood about 1¼ inches thick, cut a piece shaped as shown, Fig. 43. It is 5 inches long and 4 inches wide, with a corner cut off for neater appearance. With a rasp or a drill press equipped with a fly cutter, make the 4-inch end concave, the curvature being the same as that of the upright. Cut a strip of tin-can material 4 inches wide and 11 inches long, and round the ends to a 2-inch radius. Fold the strip crosswise in the middle. Along lines 1 inch from this fold, bend the two halves outward about 45 degrees, then curve them around the upright. Drill three screw holes toward the rounded end of each half of the strip, and make a hole about 5/16 inch in diameter about ½ inch from the central fold and midway between the edges of the strip. This last hole is to receive a ¼-inch bolt with washer and wing nut.

Fasten the tinplate piece to the wooden arm as shown. When everything is adjusted right, the curved end of the wooden piece and curved portions of the tinplate fit snugly around the upright; and when the wing nut is tightened, the arm is locked securely to the upright. This is just about the simplest arm arrangement that can be made with ordinary tools.

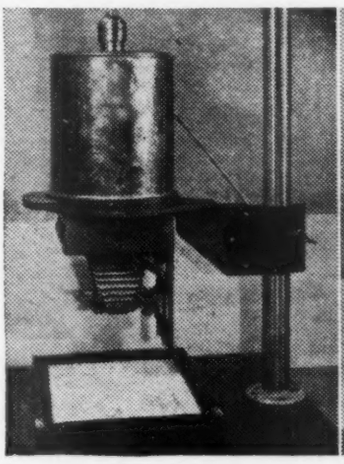


**Fig. 43. Vertical enlarger with camera is braced for rigidity.**

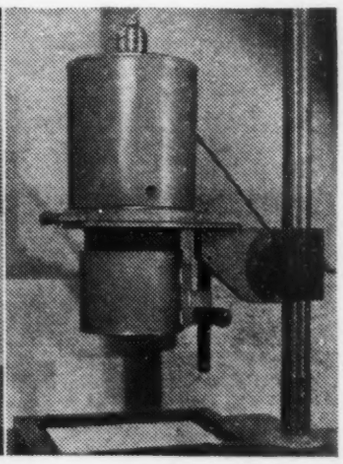


**Fig. 44. Focusing-type vertical enlarger has a permanent lens.**

Construct the lamphouse, negative carrier, and wooden-disk arrangement exactly as described for a horizontal enlarger. But instead of shaping the upright piece of plywood with parallel sides and a square end, taper it from the circular disks to a width of about 1½ inches. This piece will hereafter be called the main plywood section. Use wood screws to fasten the tapered portion of the main plywood section to the top of the arm. It may be necessary to run a brace from a point on the top of the arm near the upright to the side of the lamphouse, as shown, to produce the required rigidity. This brace can be tinplate folded twice. Fasten it to the lamphouse with a self-tapping screw or small bolt.

With the lamphouse in a vertical position, a ventilation system somewhat different from that in a horizontal housing should be used. In the model shown, this consists of four ½-inch holes spaced at equal distances about 1 inch above the bottom of the housing, and five ⅜-inch holes forming a circle about ¾ inch from the lamp socket in the lid. All of these holes are baffled with arched strips soldered in place. It is a good idea to rivet those on the top, for if the lamp is left on for a prolonged period, it may overheat the lid enough to melt the solder.

You will find this enlarger extremely easy to use; and if the camera has a well-corrected lens, first-rate projection prints can be made with it consistently. After all, the sharpness of an enlargement depends primarily on the quality of the lens through which the projection print is made, as well as that of the lens on the camera that made the negative.

If you want to improve the performance of the enlarger by increasing its power and therefore shortening the exposure time, replace the opal or groundglass diffusing screen with a condenser. Use a plano-convex lens whose diameter is greater than the diagonal of the negative. Place it with its flat surface downward and an inch or so from the negative: this separation is not particularly critical. The lamp should have an opal bulb that diffuses the light to such an extent that no filament hot-spot can be seen, as is the case with ordinary inside-frosted bulbs. Such diffusing-glass enlarging lamps are available. You may have to experiment a little with the separation between lamp and condenser, before you obtain even illumination. A condenser lens will increase the weight of the enlarger somewhat, but in a miniature enlarger this is scarcely enough to be noticeable.

A word of caution: When a camera is attached to an enlarger, it should be a type whose lens can be moved back until the distance from the lens to the negative is almost as small as the focal length of the lens. Maximum separation between lens and negative is, for a 1:1 enlargement (natural size) twice the focal length. Thus for a 3-inch lens, the dis-

tance from negative ranges from 3.3 to 6 inches, for 1x to 10x enlargements. Cameras with limited lens movement should be provided with auxiliary focusing controls, such as that described in the following section.

## Part III.

## Vertical Model with Focusing Adjustment.

The vertical enlarger described in Part II made use of a camera that had its own focusing mechanism, and therefore the construction was much simplified. When no such camera is available, or when it is otherwise desirable to use a lens not having a focusing mount, you will have to provide a means of moving the lens smoothly toward and away from the negative.

Construction of the base, column, lamphouse, and bracket are practically the same as for the enlarger in Part II. The only difference is that the strips or clamps required for fastening the camera to the main plywood section are omitted. Also, the wooden block forming the bracket may have to be shaped a bit differently at the outer end to permit unobstructed operation of the focusing controls; and this block has to be slotted to receive a vertical metal bar (Fig. 44).

The conventional way of coupling an enlarger lens board to the film-carrier housing is by installing an accordion-type bellows between them. Often such a bellows can be salvaged from an old camera; or you can fold one from thin leather, imitation leather, or other light-tight fabric. The enlarger shown in the photographs makes use of a novel substitute for a bellows. This consists of two metal cylinders—actually one empty coffee can and one empty sodium sulfite can—arranged so the larger one, to which the lens is attached, slides over the smaller one which is fastened to the main plywood section.

Maximum length of the outer cylinder is such that the lens can be moved to within a distance of its approximate rated focal length from the negative. In the model shown, this cylinder is 4 inches long, for use with lenses of 5 to 5½ inch focus. The diameter of the outer cylinder is 5¼ inches, that of the inner cylinder, 5 inches, which leaves ⅛ inch clearance all around. Length of the inner cylinder is 3¾ inches. Of course, you can vary the dimensions to suit the negative and lens you intend to handle. The inner cylinder should be no smaller in diameter than the diagonal of the negative; and the outer cylinder should be short enough to permit the lens to

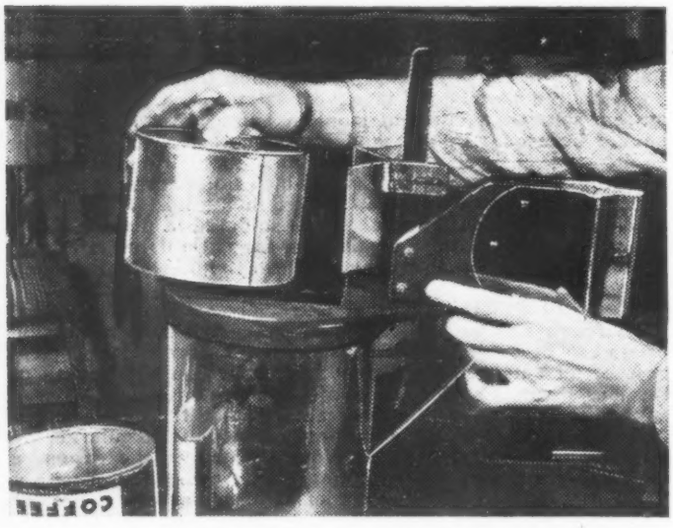



Fig. 45. Moveable half of telescoping "bellows" arrangement is being placed. It will encircle the coffee can shown at left.

be racked to within its approximate focal length of the negative. Stove pipe can be used for the cylinders instead of empty cans.

Cut the inner cylinder to length, and solder four L-shaped tinplate lugs to it so it can be fastened to the plywood with small nails or screws. Center it with respect to the negative opening. Be sure the nails or screws do not pass through into the negative carrier recess. Paint the inside and outside of the cylinder a dead black.

While the inner cylinder is open at both ends, the outer one is a section of can with the bottom left in place, or a piece of stove pipe with a metal or wooden disk fastened over one end. In the center of the bottom or the disk, cut a hole to receive the lens. This lens can be a regular enlarger objective or one taken from a camera. It should have an iris diaphragm, and be equipped with a mounting flange or nut. Its maximum speed can be anywhere from *f* 8 to *f* 3.5, with *f* 4.5 as a happy medium for all-around work. After the outer cylinder has been cut to shape and the lens hole made, lay it aside while you make the focusing mechanism.

Obtain a bar of steel or other metal about ⅛ inch thick and ¾ inch wide, and round the edges to a radius of 1/16 inch. Cut it about 1 inch longer than the maximum distance between the bottom or lens-end of the outer cylinder and the lower surface of the main plywood section when the lens is

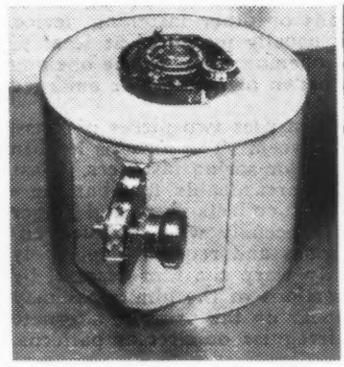


Fig. 46. The completed focusing assembly with its wheel block.

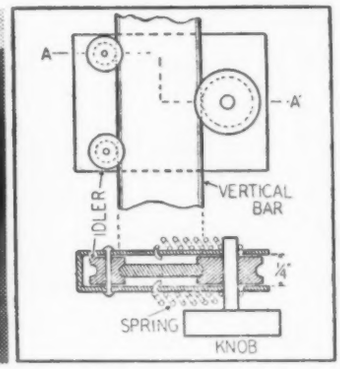



Fig. 47. Construction of wheel block that rides vertical bar.

racked down as far as necessary, or until the cylinders are about to separate. In the enlarger shown, which is fitted with a 5-inch lens, the bar is 8 inches long. Be sure the bar is absolutely straight and its edges parallel; and if you can find a chromium-plated piece like that illustrated, so much the better. Cut a slot as wide as the bar is thick, in the outer end of the wooden block forming the arm. Insert the bar, drill a hole through the wood and metal, and use a bolt to clamp the bar in the slot with moderate tightness. Adjust the bar until it is square with the arm, and drill a hole for a second bolt. These bolts should hold the bar absolutely rigid. A little glue or pyroxylin cement in the slot will increase the rigidity.

From a strip of stiff sheet brass or other metal about 1 x 3¾ inches in size, bend a U-shaped piece measuring 1 x 1¾ inches on a side, with a ¼-inch space between the two sides for the "wheel block." In this space mount three grooved wheels as shown in Fig. 47. These can be small pulley wheels or pieces machined on a lathe. The two smaller wheels, ¼ inch or so in diameter, are idlers and revolve around brass escutcheon pins riveted in place. The large wheel is about ¾ inch in diameter, and is mounted solidly on a rod to which a radio knob is attached. The holes in the plates through which this rod runs are slots, to permit the wheel to move toward or away from the two idlers for a total of ⅛ inch or so. Short, rather strong coil springs whose ends encircle the rod act to pull the large wheel toward the smaller ones. The other ends of the springs engage holes in the plates. Thus, when the vertical bar is run through the arrangement, so the grooved wheels ride its rounded edges, the springs create a squeezing pressure. When the knob is turned, the wheel block moves along the bar; and when it is released, the block remains in position.

To the closed edge of the wheel block (base of the U), solder a rectangular strip of tinplate measuring about 3¼ x 3¾ inches, and after bending it as shown in Fig. 45, solder this in turn to the side of the outer or lens-bearing cylinder. It may be necessary to bend an inch-wide strip of tinplate around the vertical bar above the wheel block, and solder its ends to the first tinplate piece, to reduce the tendency of the whole assembly to tilt under the weight of the lens. By bending the larger tinplate piece before soldering it to the can, you can vary the distance between the cylinder and vertical bar, to make the two cylinders line up. As a safety precaution, drill a hole in the vertical bar ¼ inch from its lower end and insert a small bolt (Fig. 44). This keeps the wheel block from running off. Paint the inside of the outer cylinder black. The completed assembly is shown in Fig. 46.

This completes the enlarger, except for painting external surfaces to improve appearance. For the outside of the adjustable cylinder and the tinplate piece that attaches it to the wheel block, use brushing or spraying lacquer or enamel of any pleasing color. The wooden arm, negative-carrier housing, and carrier itself can be lacquered or simply stained.

Alternate construction: The focusing arrangement described, in which three grooved wheels grip the edges of a vertical metal bar, is but one possible method of controlling up-and-down movement of the lens. If you can obtain a brass rack and matching pinion, say a rack ⅛ to ¼ inch wide, you can solder or otherwise fasten it along the edge of the bar, and substitute the pinion for the grooved wheel on the knob shaft. You will not need the coil springs, but the fit between the block and bar should be close.

Another variation is to omit the two idler wheels and let the closed end of the U slide along the edge of the vertical bar, helped if necessary by a film of oil or petroleum jelly. If you have access to a milling machine, you can make the brass wheel block in one piece and slot it to fit accurately around the bar and to receive the pinion or grooved wheel.

If you use a bellows instead of the telescoping cylinders, make a lensboard of metal or wood and fasten it to the wheel block. Usually the best way to attach the ends of a bellows is to cut a rectangular metal frame that will fit snugly inside the end fold, and secure it with screws, the fold being sandwiched between it and the lensboard or plywood section. Sometimes the frame can have a circular opening so it will slip over the lens barrel and be secured by a threaded lens ring.

If you construct this device with care, fitting all parts accurately, you will have an enlarger that will give long and satisfactory service. If you do not like to use wood for any of the parts because of an abnormally damp condition in your darkroom, you can construct the negative holder, the various pieces forming the negative-holder housing, and the arm from metal in the form of castings or sheet stock bent to shape and soldered.

## ENLARGING EXPOSURE METER.

BY means of an enlarging exposure meter you can build for a dollar or so, the correct printing time for each negative and grade of paper can be determined. The meter is of the greasespot photometer type, operates from standard house current (115-volt), and is merely placed on the enlarging easel when taking a reading (Fig. 48).

The parts you will require are as follows: For the housing, an empty 35-millimeter film can of 50-foot capacity, or an equivalent metal box or can about 4 inches in diameter and 1¼ to 1½ inches deep.

Two 7-watt, 110-125 volt lamps of the type used in night lights and for Christmas tree decoration (not the series-connected tree lamps), with white bulbs.

One small candelabra switch of the type used in desk lamps, etc., either toggle, push-button, or turn-button type.

One radio potentiometer or "volume control," 5,000-ohm, 2-watt. This is a center-tapped unit (having three soldering lugs). A two-terminal rheostat is just as satisfactory if available in a 4,000- or 5,000-ohm size.

One calibrated dial 2 inches in diameter of type shown, to fit potentiometer shaft; or a stiff metal disk from which dial can be made, with knob to control it. Shops selling used radio parts have suitable dials calibrated through 180 degrees or more.

One insulating bushing for lamp cord.

Flexible lamp cord (3 feet) and plug.

Piece of white typewriter paper.

Miscellaneous wire for making connections, solder, bit of clear varnish, and crystalline lacquer or other material for outside finish.

The bottom of the round metal box is the top of the meter. Across it scribe a line passing through the center. At a point 1⅜ inches from one end of this line, punch or drill a hole to receive the potentiometer stud (threaded brass part). At a point ⅝ inch from the other end of the line, make a punch mark and drill a ½-inch hole. An easy way to make such large holes in thin metal is to punch or drill a small one first, then ream it to size with a tapered reamer in a hand brace. At a point to the right or left of the scribed line, and 1⅞ inch from the potentiometer hole and 1½ inches from the second hole (measured between centers), make a hole to receive the switch. The exact distance of this hole from the housing edge or side will depend on the design of the switch.

The two lamps are held by clips soldered to the underside of the housing top (bottom of can) as shown in Fig. 49. Bend the clips from pieces of tin-can material measuring about ⅝ x 2 inches. Cut similar strips of heavy paper or thin fiber to insulate these clips from the lamp bases. Since the lamps are burned in series and, therefore, have an extremely long life, they are connected by soldering wires to them, thus eliminating the necessity of sockets.

Paint the inside of the housing a dull black, to kill light reflection. Mount the various parts temporarily, and wire them so the two lamps, switch, and potentiometer are in series (Fig. 51). The current passes through first one and then the other in traveling around the circuit. Solder all connections carefully. Be careful not to crack the lamp bulbs when sol-

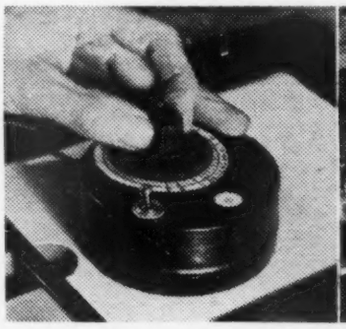


Fig. 48. Meter is placed on the easel and adjusted as described.

Fig. 49. Two clips in housing hold small 7-watt 110-v. lamps.

dering wires to the threaded shells: you will find spots of solder already on the shells and the center contact, which makes the job easy. The lamp cord enters the housing through a bushing placed near the potentiometer, in the model shown. However, you can bring the wire through at any other point, if you think it more convenient.

In wiring the circuit, make sure that no part of it makes contact with the meter housing. Handling electrically-charged equipment in the darkroom may be hazardous because of a damp floor or the presence of water pipes and other grounded objects.

After all parts are soldered, and one of the lamp bulbs has been centered carefully over the ½-inch hole, loosen the potentiometer, switch, and bulbs and slip them out of the

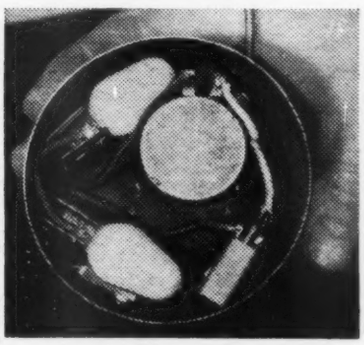


Fig. 50. Interior of exposure meter as seen from the bottom.

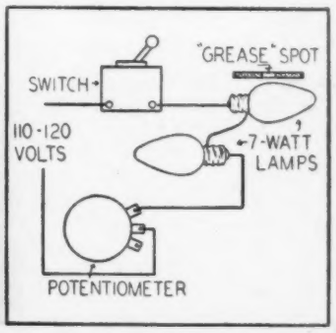



Fig. 51. Wiring diagram shows how to connect up the parts.

housing. You need not disconnect the lead wire if you do not want to. Give the outside of the housing a coat of crystal lacquer or any other pleasing finish. You could have done this in the first place, before wiring the circuit; but invariably the finish would be marred during the soldering operations, adjustment of the switch position, etc.

When the finish is dry, cut a square of white typewriter paper to fit over the ½-inch hole. In the center, place a small drop of clear varnish. Usually this will penetrate the paper all the way through. If not, apply a little to the other side. The varnish, which should be permitted to dry before the meter is calibrated, makes a small, translucent "grease spot" in the paper. With glue or pyroxylin cement, mount the square of paper inside the housing, with the grease spot in the center of the ½-inch hole. Replace the various parts (Fig. 50). When fastening the potentiometer, cut a disk of white paper about 2½ inches in diameter and clamp it in position with the potentiometer nut. Mount the calibrated dial so it clears this paper disk by about 1/16 inch. You probably will have to cut off some of the potentiometer shaft. Set the dial so the mid point on its scale is toward the grease spot when the potentiometer is set midway between the high and low positions or limits of movement. In connecting the potentiometer, you use the center tap and but one of the end taps. By selecting the proper end tap, you can make the

lamps get dimmer with either a clockwise or counterclockwise movement of the dial. If you want the time scale (on the disk) to run clockwise—the most convenient direction, make the connections so the lamps get dimmer as the potentiometer shaft is rotated clockwise. Incidentally, only the lamp behind the grease spot is important, as far as light output is concerned. The other acts merely as a resistance unit of about 2,000 ohms. You can, if you desire, use a 2,000-ohm, 10-watt, wire-wound radio resistor instead of this lamp. The lamp, however, will cost only a fraction as much.

If you place the meter in ordinary daylight or room light, the grease spot on the paper will look dark no matter whether the lamp behind it is burning at its full brightness or not. But when the meter is placed in weaker light, such as that coming through the thinnest parts of a negative in an enlarger, the grease spot will look bright when the lamp is burning at or near its brightest point, and dark when the lamp is dimmed. At some point in between, the grease spot will be practically invisible.

Now to calibrate the instrument. Place a 7-watt lamp at one end of an unobstructed area, such as a table top, about 5 feet long. Lay a yardstick or folding rule so it extends out from the lamp and has its zero end directly below the filament if the lamp has a clear bulb, or directly below the surface of the bulb if the glass is frosted or opal white. Hold the meter with the grease spot directly above the 4-inch mark on the ruler, so the light from the lamp strikes the paper surface perpendicularly (Fig. 52). Adjust the potentiometer dial until the grease spot is neither bright nor dark, but is as nearly invisible as you can make it. Sometimes the varnish gives the spot a yellowish tinge, and the use of a light blue filter such as a piece of cellulose film, between the lamp inside the housing and the grease spot, will make it easier to judge the "disappearing point."

With a pencil, make a mark on the paper disk opposite the mid point of the calibrated dial. In the meter shown, this mid point is at 50 on the scale. Mark a "4" near the mark, to indicate the inch position. Move the meter to the 5-inch position, and make another mark. Continue for other distances until you have moved the meter 48 inches from the lamp. You may, if you desire, take readings at still greater distances; but usually 48 inches from a 7-watt lamp will prove adequate, since it covers a time range of more than 2 minutes. You need not mark every inch.

Your paper scale contains a series of figures indicating the distance from the lamp in inches. It is necessary to convert these into time factors by squaring each one and dividing by the square of the initial distance, which was 4 inches in this case. This works out, in the pilot model, according to the following table:

| Inches | Seconds exposure |
|---|---|
| 4 | 1 |
| 5 | 1½ |
| 6 | 2 |
| 7 | 3 |
| 8 | 4 |
| 9 | 5 |
| 10 | 6 |
| 11 | 7½ |
| 12 | 9 |
| 14 | 12 |
| 16 | 16 |
| 18 | 20 |
| 20 | 25 |
| 22 | 30 |
| 24 | 36 |
| 28 | 50 |
| 40 | 100 |
| 48 | 144 |

Re-check each reading several times. If there is a little variation, don't worry about it too much: it probably results from the inability of your eyes to judge the grease spot exactly the same each time; or it may be caused by slight voltage variation. The normal latitude of enlarging paper is more than enough to take care of such slight variations. When the scale is finally worked out, it can be checked quickly as follows: Take a reading at any distance from a light source. Say it is 25 seconds for the 50 mark on the calibrated dial. Now move the meter twice the distance away. The reading should be four times the number of seconds, or 100 in the example. This is in accordance with the physical law that light varies in intensity as the square of the distance from the source.

Mark the case with a spot of ink or water color opposite the "1" point on the paper disk, and also mark the potentiometer so you can return it to its exact position. Remove the disk and, using it as a pattern, make a careful copy on stiff, white cardboard or metal. Cardboard is satisfactory enough. Use India ink, and coat the disk with clear lacquer when it is finished. Install this disk, replace the potentiometer, and make sure the 2-inch dial is in the position it occupied when the calibration was made. Your meter is now ready to use.

Select a negative and from it make the best print you can, on whatever grade and kind of paper you desire to use with

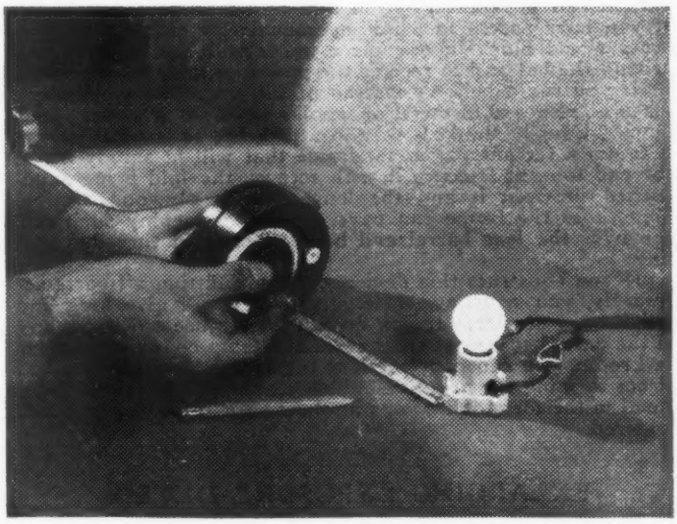


**Fig. 52. Calibrating the meter, using a 7-watt spherical lamp and tape measure. Readings are obtained at different distances.**

the meter. Say the exposure is 9 seconds. Without changing the intensity of the enlarger lamp, hold the meter so the grease spot is under the thinnest (brightest) portion of the projected image of the negative. Move the potentiometer dial until the grease spot does its disappearing act, and note what number on the dial scale is opposite the 9-second mark on the fixed time scale. Say it is 75. Mark the batch of paper with this key number. Thereafter, when you want to take a meter reading to determine the exposure for that batch of paper, use 75 on the movable scale as an index mark in reading the time scale.

In this way, you determine the key number for each make and grade of paper. Each new package of paper should be rated individually, for slight variations occur even if the make, grade, and surface are the same as preceding packages. Also, you should keep your developer reasonably uniform as to formula and temperature, for any considerable change will affect the key number.

Although the usual way of checking a negative with a photometer of this type is to read the brightest part of the image, I often prefer to measure the light coming through the densest area (which forms the brightest highlight of the print). The method of determining and using a key number for the paper is the same. You may find that no part of the dial scale comes opposite the exposure time as determined by a test strip. In this case, you can make an index mark with a pencil on the face of the dial; but it is better to loosen the dial and rotate it until the scale is in a usable position. Any change of this sort will, of course, necessitate a determination of new key numbers.

When the meter is held against the paper easel, the grease spot window is 1⅝ inches or so from the easel surface, and the negative image will be out of focus on the grease spot while in sharp focus on the easel. This normally is satisfactory, provided the same conditions are maintained for all readings.

This meter can be used to measure the relative contrast of a negative. Measure the thinnest and the densest parts of the projected image, using the same index mark for each; and then compare the time-scale readings. Suppose the thinnest part reads 2 seconds and the densest part 24 seconds. The relative contrast is then 2:24 or 1:12. You can use these figures in selecting the proper grade of paper: that is, measure a number of negatives for which you know the best paper contrasts, and make up a little list or table showing the range of contrast best suited for each grade of paper. Then when you check an unknown negative, you can select the proper paper by referring to the table.

## FOOT SWITCHES.

THE most convenient way of controlling the lamp in an enlarger or contact printer is with a foot-operated switch. Such a switch is also useful for turning on a colored or white inspection light for a few seconds, and for operating various workshop tools.

Foot switches can take a variety of forms. One of the most common home-made arrangements consists of an automobile headlamp control or foot-operated starter switch mounted in a wooden frame. A switch originally intended

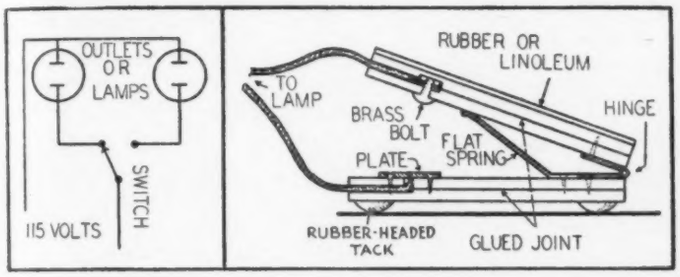



**Fig. 53. Left, auto dimmer switch used to control two lamps. Fig. 54. Right, blocks hinged to form book-type foot switch.**

for controlling the upper and lower beams of automobile headlamps can be wired so it turns off a safelight lamp at the instant it turns the enlarger on (Fig. 53). This is convenient when the safelight tends to dim the projected image. Although automotive switches are designed for carrying heavy amperage at 6 volts, they seem to perform well when handling 115 volts.

These switches normally are grounded on the automobile frame, and thus their housing becomes a part of the automobile electrical circuit. When used on a house circuit they should be insulated well by mounting them in a wooden box or frame, or by surrounding them with some other nonconducting material. It is a good idea to slip a rubber crutch tip over the foot button, both for comfort and as an added bit of insulation.

Another simple form of foot switch consists of two boards, each measuring about ⅝ x 3 x 7 inches, hinged together at one end so they open and shut like the covers of a book. A spring holds them open so the unhinged ends are about 2½

**Fig. 55. An old bell serves as a cap for foot-switch plunger.**

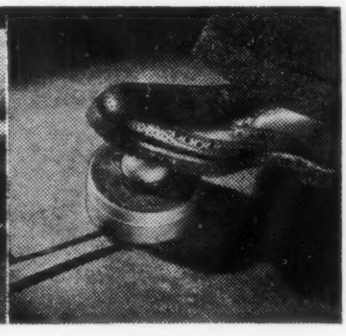


**Fig. 56. Switch is rugged and can be moved easily with foot.**

inches apart. When they are pressed together by the operator's foot, two electrical contacts come together. One of these contacts can be a small disk or square of brass, the other a fairly large brass bolt or wood screw. Construction of such a switch is shown in Fig. 54. Note the rubber-headed tacks on the bottom board of the switch, which have a double purpose. They serve as insulators where a floor may be damp, and prevent the switch from slipping when in use.

A compact, serviceable foot switch can be made from an empty 35-millimeter film container of 50-foot capacity. The construction is simple, and the unit is compact and free of bothersome corners and projections. The contacts are enclosed and sealed against dirt, which makes the switch particularly suitable for darkroom service (Fig. 56).

From plywood or other material about ½ inch thick, cut two disks to fit inside the film can. One of these should fit somewhat tightly, while the other should be free to move without binding. In the center of the smaller or upper disk, bore a hole to receive a piece of ⅝-inch wooden dowel about 2¾ inches long. In the center of the lower disk, bore a hole slightly larger, so the dowel will slide freely in it. Force the dowel through the upper disk so that enough projects to prevent the lower end from leaving the hole in the bottom disk when the top surface of the upper disk is even with the edge of the film can. Thus when the disks are inside the can, one remains on the bottom while the other is free to move up and down somewhat like the piston of a steam cylinder. Secure the piece of dowel to the movable disk with glue. Incidentally, the hole in this upper disk should provide a fairly tight fit for the dowel.

A coil spring of about five turns holds the two disks normally apart. If you cannot find such a spring ready-made, you can make one from tempered brass wire or similar material. If ¼ inch of the lower end is bent at right angles and driven into the lower disk, the spring will be held in a centered position. It may be necessary to cut a shallow groove

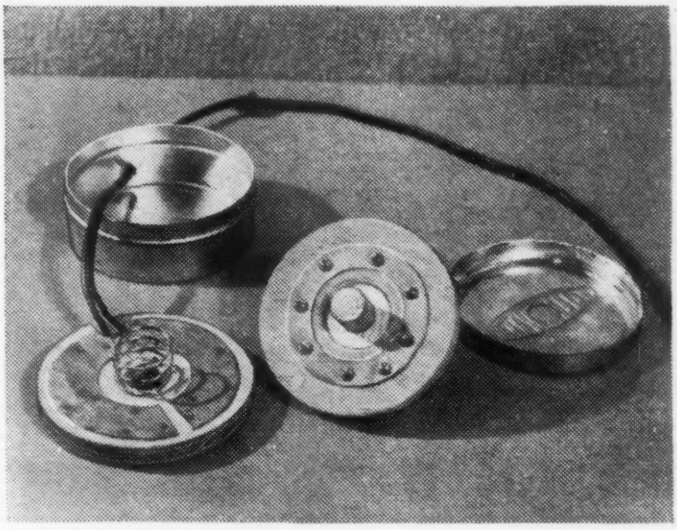


**Fig. 57. Parts of switch: left, bottom disk with semi-circular contacts and spring; center, moveable disk; right, lid with hole.**

in the lower surface of the movable disk, around the dowel rod, to provide enough space for the spring; and this will also help keep it centered with respect to the dowel.

The contact system is made from sheet brass and several roundhead brass screws or 6-32 bolts. Cut a ring from the sheet brass to encircle the hole in the lower disk. The outer diameter of this ring should be about ½ inch less than that of the disk, and the inside diameter great enough to provide ample clearance between the ring and the coil spring. Cut two ¼-inch segments from the ring, to produce two semicircular pieces, and mount these on the wooden disk with small tacks or nails, as shown in Fig. 57. At one of the gaps, cut a notch in the disk to permit the end of a lamp cord to enter. Punch a hole in the film can opposite this notch, and equip it with an insulating bushing. Solder one wire of the lamp cord to each segment of the brass ring.

Cut another ring from sheet brass to match the first one, but leave it in one piece. Fasten it to the underside of the upper disk with the roundhead screws or bolts. None of the screws, bolts, or nails that hold the rings should pass entirely through the wood.

In the center of the film container lid, made a hole a wee bit larger than the diameter of the dowel, and smooth the edges so the dowel will slide in it easily. The inch or so of dowel rod that projects above the lid serves as a foot button. In the model shown, a small hemispherical bell has been fastened, with a screw, to the button to form a smooth, wear-resisting surface for the foot (Fig. 55). A rubber crutch tip pushed over the end of the dowel will do as well.

Assemble the switch and connect the wires in series with a test lamp. If the contacts fail to close sufficiently, or if the dowel rod slips out of the hole in the lower disk, shim up this disk by putting one or more ring-shaped pieces of cardboard beneath it. Finally, fasten the lid in place with solder applied at two or three points around it.

The circuit is closed when the screw or bolt heads in the upper ring make contact with both segments of the lower ring. Because of the large contact area, and the fact that the movable disk can rotate, long service can be expected from the contacts.

## PAPER EASELS.

THE chief purposes of a paper-holder or easel used in conjunction with an enlarger are (1) to provide a surface on which to focus the image of the negative, (2) to hold the enlarging paper reasonably flat, and (3) to produce a white border around the print. Sometimes the border is not particularly desirable, but is a necessary evil caused by the strips which hold the paper edges.

A common type of easel consists of a rather large board having a hinged frame on which are adjustable strips for

**Fig. 58. This simple paper easel, made from a board and piece of sheet tin, meets the requirements of the average amateur.**

varying the size of the print opening. If you are building your own easel, this type presents a number of problems concerned with adjustment for size, and getting the edges of the opening parallel.

The average photographer sticks fairly closely to one or two print sizes, and therefore does not require the extreme flexibility of an adjustable easel. His borders, too, are always the same. And often the area of his enlarger base is not particularly generous. The simple paper holder shown in Fig. 58 will meet his requirements completely.

This paper holder, made from a piece of board and a sheet of furnace tin or similar metal, is so easy to construct that several can be turned out in an evening, to meet all normal enlarging requirements. The holder shown is for 7 x 9-inch paper, and dimensions are given for other common sizes.

For the base, use a piece of well-seasoned wood such as

**Fig. 59. Cutting mask opening in piece of scrap sheet metal.**

**Fig. 60. Spacer is placed under mask while fastening it to base.**

poplar, white pine, walnut, or plywood. The thickness should be ¾ to 1 inch. The length is 10½ inches, 1½ inches longer than the paper to be held. The finished width is 7 1/16 inches. Paper width is usually uniform, but it is a good idea to lay a sheet of it on the base to make certain there is 1/16 inch clearance at the sides. Use an undeveloped piece of paper in testing the frame. A print that has been wet and dried during the process of developing it may be considerably smaller or larger than the paper which the easel is designed to hold.

At one end of the board, make a slot 1¼ inches wide and extending inward for 2¼ inches. This is a finger opening, permitting the paper sheet to be grasped for insertion and removal. With a plane, bevel the top surface of the base for about ½ inch from the opposite end, so the thickness is reduced 1/16 or 3/32 inch. This is to provide clearance for pressing the edge of the paper so it will slip easily under the mask.

The mask is cut from a piece of sheet metal measuring 8⅝ x 10¼ inches. Lay the baseboard on the sheet so that the metal projects ¾ inch at both sides and the end opposite the finger slot, and mark around the wood with a pencil or scribe. Bend the sides at right angles along the marked lines. One way of doing this is to clamp the metal between two straight pieces of bar or angle iron, bend it by pressing with the hands, and hammer the bend lightly to make it square. Another way is to use a strip of angle or bar iron and two C-clamps to hold the sheet metal against the base while the bend is made. Slit the metal at the corners to permit lap joints to be made, and bend the end over. Solder the corner joints.

You now have a scoop-shaped tray. Slit and trim away the sides to permit ¼ inch of the open end to be folded back on the outside, to produce a rounded edge. On the outside surface of the mask, lay out the picture opening, taking pains to make the edges parallel, the corners square, and the border areas uniform in width. In the easel shown, the opening measures 6½ x 8½ inches, the border being approximately ¼ inch all around. Because of the clearance necessary to permit the paper to slip in and out easily, width of the side borders may vary a wee bit, but this is seldom if ever objectionable.

Cut out the picture opening with sharp tinner's snips (Fig. 59), and smooth the edges with abrasive cloth. Give the mask two coats of a dark-colored lacquer or enamel. Dull-finish optical lacquer is suitable. Give the area of the wood under the mask a coat or two of white lacquer, enamel, or casein paint, preferably a type having a surface not extremely shiny. Casein paint has a natural eggshell surface, and one of the highest reflective factors of any finish. This provides a surface on which to frame and focus the image. Paint the projecting portion of the base, beyond the mask, some color that wears well.

Fit the mask over the base, slip some thin cardboard, fairly heavy sheet metal pieces, or a steel ruler under the mask to raise it slightly off the wood (Fig. 60), and drive two nails through each side into the base. Glue a layer of felt over the bottom, or install four small rubber-headed tacks as "feet," and your paper-holder is complete. You will find that it is as easy to use as anything you could desire, and that it never gets out of order. You may have to do a bit of adjusting at first to secure proper clearance between the mask and the base.

By making a set of such easels and keeping them in a handy place, you can select the one desired in less time than you can move the border strips on an adjustable type. In general, a border ¼ inch wide is satisfactory for all paper sizes including 11 x 14 inches. For very small prints, you can drop to ⅛ inch. Some kinds of commercial work require an extremely wide border, such as ¾ inch all around on an 8 x 10-inch sheet. After a wide-border print becomes dog-eared from much handling, it can be trimmed to make it almost as good as new and still have a border.

**Suggested sizes for other paper holders (in inches)**

| Paper | Base (¾ inch thick) | Mask (Size of sheet) | Border | Mask opening |
|---|---|---|---|---|
| 2¼x 3¼ | 2 5/16x 4¾ | 3 13/16x 4½ | ⅛ | 2 x 3 |
| 3¼x 4¼ | 3 5/16x 5¾ | 4 13/16x 5½ | ⅛ | 3 x 4 |
| 4 x 5 | 4 1/16x 6½ | 5 9/16x 6¼ | ¼ | 3½x 4½ |
| 4 x 6 | 4 1/16x 7½ | 5 9/16x 7¼ | ¼ | 3½x 5½ |
| 5 x 7 | 5 1/16x 8½ | 6 9/16x 8¼ | ¼ | 4½x 6½ |
| 5 x 8 | 5 1/16x 9½ | 6 9/16x 9¼ | ¼ | 4½x 7½ |
| 7 x 9 | 7 1/16x10½ | 8 9/16x10¼ | ¼ | 6½x 8½ |
| 8 x10 | 8 1/16x11½ | 9 9/16x11¼ | ¼ | 7½x 9½ |
| 11 x14 | 11 1/16x15½ | 12 9/16x15¼ | ¼ | 10½x13½ |

One quality of these individual easels, their compactness and lightness, is also a drawback at times, for they are easily shifted on the enlarger base by accidental bumping. This hazard is also present to some degree with any easel not anchored to the baseboard. There are various ways of eliminating this trouble, but one of the simplest is to make or have a welder or machinist make for you a heavy, L-shaped frame that can be laid on the baseboard. This frame can be made from iron bar stock measuring ¾ x ¾ inch or ¾ x 1 inch in section.

For all-around use with various easel sizes, make one leg about 7 inches long and the other 10 inches. Cement strips of felt on the lower surface. This gadget is heavy enough to remain wherever it is placed, and the easel is simply slid

against it. After easel and frame, moved together, have been positioned with respect to the picture, the easel can be removed and replaced at will, and as long as the frame is not forcibly moved, the image will remain properly masked.

A sheet of black paper, placed between the sensitized paper and white surface of the easel, may improve print contrast, especially when single-weight paper is used.

## PAPER SAFE WITH SAFETY SWITCH.

A LIGHT-TIGHT box with a convenient, tight-fitting door or lid—commonly called a paper safe—is one of the most useful of darkroom accessories. It holds one or more varieties

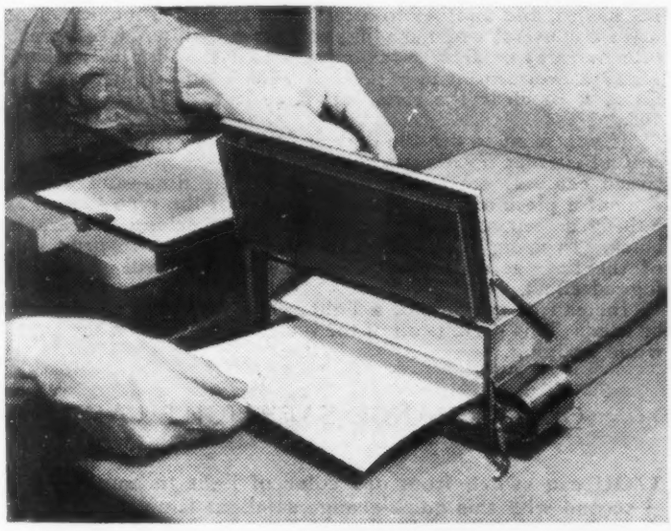


**Fig. 61. Paper safe in use. Door cannot be opened unless safety switch controlling white room lights is in the "off" position.**

of enlarging or contact printing paper. Such a container is "safe" only as long as someone doesn't open the door or lid while the white lights are on. The model illustrated has, as optional equipment, a switch that eliminates this hazard (Fig. 61).

A paper container should be made to suit individual needs —that is, it should be arranged to hold sheets of paper in

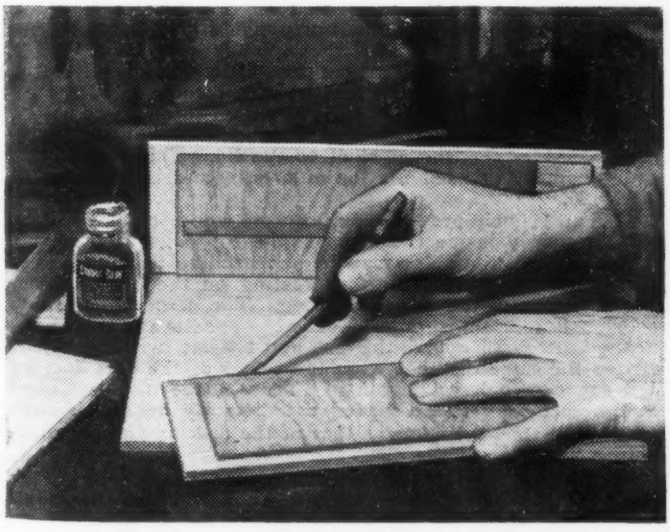


**Fig. 62. The safe is made of plywood, and all joints are glued securely to make the box light-tight. Inside is painted black.**

sufficient sizes and types of emulsions to meet the owner's requirements. The unit illustrated in Fig. 61 is one of the simplest forms, and holds two kinds of paper 8 x 10 inches or smaller. Simply by changing the height, it could be made to accommodate additional grades; and by providing it with a divided drawer, it could be arranged to hold small paper sizes in considerable variety.

The box is built mostly of plywood, and has a door made of ¾-inch white pine. The parts required are:

2 pieces (top and bottom) ¼ x 8⅜ x 11¼ inches.
1 piece (partition) ¼ x 8⅛ x 10¾ inches.
2 pieces (sides) ¼ x 3¾ x 11¼ inches.
1 piece (back end) ¼ x 3¼ x 8⅜ inches.
1 piece (door) ¾ x 3¾ x 8⅞ inches.
2 pieces (lining, sides) ⅛ x 3¼ x 10½ inches.
2 pieces (lining, top and bottom) ⅛ x 8⅛ x 10¾ inches.
2 small hinges, butterfly or butt, with short screws.
1 small coil spring, about ¼ inch in diameter and 3 inches long.
Glue; brads; knob.
For the safety switch, parts as indicated in text.

Assemble the parts so that the over-all, outside size of the box, exclusive of the door, is 3¾ x 8⅞ x 11¼ inches. Glue all joints well, to make them light-tight (Fig. 62). When the ⅛-inch lining, which also may be plywood, is installed,

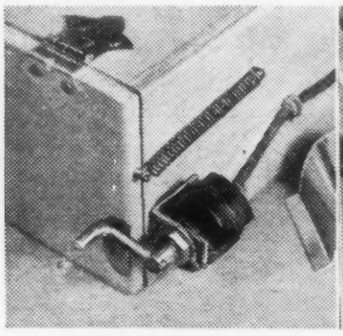


**Fig. 63. The hinge, spring, and electric switch shown in detail.**

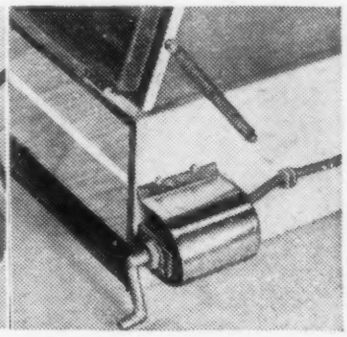


**Fig. 64. The coil spring snaps around to hold safe door open.**

there will be a recess at the open end of the box extending inward ½ inch. Rabbet the edges of the door to fit snugly into this recess, leaving about ¼ inch of the door thickness to overlap the edges of the box top, bottom, and sides. Paint the inside of the door and its recess a dull black; and it is preferable to treat the remainder of the interior the same way. The outside may be any finish desired.

Hinge the door to swing upward, and equip it with a convenient knob. Attach the coil spring, by means of two round-head wood screws, as shown. It normally holds the lid tightly closed; but the lid can be swung upward so the spring snaps around and holds it open.

### Safety Switch.

The safety switch is installed so that, when it is at the "on" position, the handle projects in such a way that the door cannot be opened. The switch shown (Figs. 63 and 64) is a rotary type sold for use on radio equipment, etc., and has a handle that swings through an arc of 90 degrees. It is mounted to the side of the box by means of an L-shaped bracket. The original handle was a small pin ending in a ball-shaped knob, and was too short. It was replaced with a piece of 3/16-inch brass rod 1 inch long and having a short handle soldered to it as shown. The switch position was adjusted so the handle overlaps the edge of the door when at the "on" position, but swings down out of the way when turned to the "off" position.

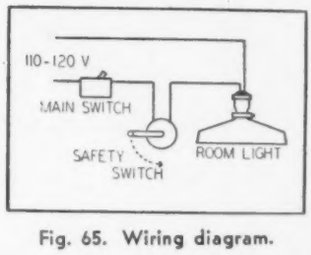



**Fig. 65. Wiring diagram.**

A small metal plate tacked to the door prevents the handle from wearing a groove in the wood. A length of rubber-covered lamp cord runs from the switch to the circuit that controls the white lights in the darkroom. That is, the safety switch is wired in series with the main darkroom white-light switch (Fig. 65). A cover made from tin-can material and held in place by four small nails prevents accidental contact with the terminals of the switch.

The paper-safe door can be opened only when the switch is turned off, and therefore, only when the darkroom lights

are out. The switch could, of course, be turned to the "on" position when the door is opened, but this normally is not likely to happen. If the door is provided with a stop—a block of wood fastened to the top of the box—so it cannot be swung back far enough for the spring to hold it open, the danger of turning on the white light with the door open is eliminated.

If a switch of the kind shown cannot be obtained, a small toggle switch of the type used in lamps, radio receivers, and on motors, can be equipped with a longer handle and mounted so it functions in the same way.

## DODGING DEVICES.

PRACTICALLY all dodging necessary to permit local control in projection printing can be accomplished with two simple gadgets. One of these is merely a tuft of cotton on a wire, and is used to hold back the light over a small area of the image while the remainder continues to print.

Obtain a piece of stiff wire 7 or 8 inches long. Bend a loop

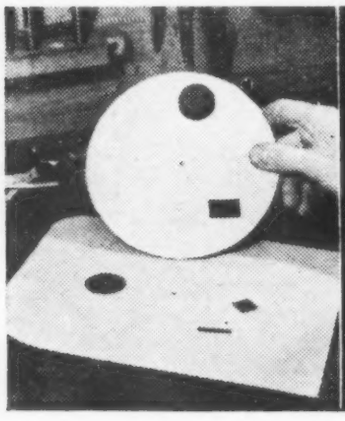


Fig. 66. Dodger has two parts —opaque base and rotating disk.

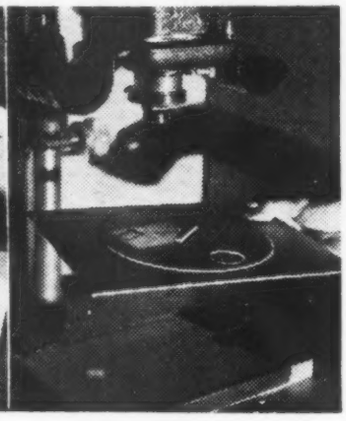


Fig. 67. Device used for local control in projection printing.

at one end to form a handle, or insert the wire into a hole in the end of a 3-inch length of ½-inch dowel rod. At the other end of the wire bend a small loop or hook to hold the tuft of cotton. The best size of tuft is easily found by trial. The fuzzy edges prevent abrupt changes in the image tone. Keep the handle and cotton moving during the dodging period.

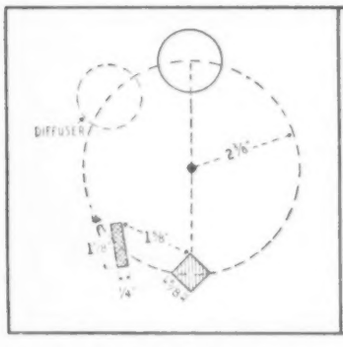



Fig. 68. Pattern for rotating disk of the cardboard dodger.

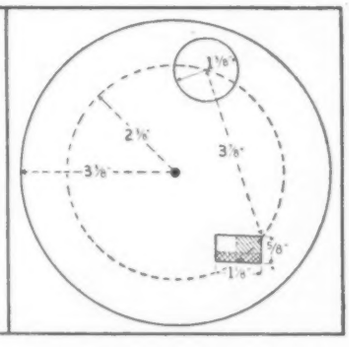



Fig. 69. Base pattern. Shaded parts of openings should match.

The other gadget is an opaque sheet with a hole in it, the hole permitting a little of the negative image to reach the enlarging paper while the rest is held back. From two pieces of stiff cardboard, you can make an adjustable dodger that will produce a wide variety of openings ranging from circular to rectangular. Trim one sheet to form a rectangle measuring about 8 x 10½ inches. From the other sheet, cut a disk 6¾ inches in diameter. Punch or drill a hole through the center of each piece to receive a small rivet (Figs. 66, 67).

In the cardboard disk, make a circular and a rectangular hole as shown in Fig. 68. The sizes of these may vary, but 1⅜ inches will be about right for the circular opening, ⅝ x 1⅛ inches for the rectangular.

Mount the disk on the rectangular cardboard piece, and mark the positions of the three openings in it. One of these is a circular opening coinciding exactly with that in the disk, and having its center midway between the longer edges of the cardboard. Another opening is a square measuring ⅝ inch on a side, and still another is a slit ¼ inch wide and 1⅛ inches long (Fig. 69). These various openings must be positioned so that, as the disk is rotated, only one is uncovered at a time.

Normally the circular hole in the disk is adjusted to overlap the circular opening in the rectangular base, while the rectangular opening is adjusted over either the square or the slit. By varying the degree of overlap, a considerable variety of shapes and sizes is produced. The rectangle and the slot can be overlapped to produce triangular openings. Still another trick is to insert one or two fingers through the superimposed circular openings, and by moving them about, vary the size and shape of the hole through which light can pass.

Round one corner of the base piece to a radius of about 1⅛ inches, and another to a radius of about 1¾ inches. This feature is useful when shading corners of prints. Use a small tubular rivet or similar fastener to join the disk to its base. Make a wooden handle ¼ inch square and 2 inches long, notch it to clear the rivet, and glue it to the center of the disk.

If you want to use the dodger for diffusing prints, make a second circular opening in the base piece—about 2 inches (between centers) counterclockwise from the first—and over it cement a piece of very fine wire screen of the type known as bolting screen, or a piece of sheer silk stocking, preferably black. In using this diffuser, permit the image to print part of the time at maximum sharpness, or you will produce a fogged effect.

Instead of cardboard, a light red transparent plastic can be used. This permits all of the image to be seen on the paper while dodging.

## QUICK-CHANGE SAFELIGHT LAMP.

YOU can switch from one color of light to another in a second with this quick-change safelight lamp of novel design. It carries three circular safelight filters ,sufficient for all ordinary darkroom requirements.

The body of the lamp is a large tin can having a tight-fitting lid. An empty 5-lb. sodium carbonate can was used for the model illustrated. It measures 6⅛ inches in diameter and 6½ inches long. Turn the can bottom-up, and determine the exact center by describing arcs with a compass. Make a punch mark at the center and draw a radius line extending from this mark to the edge. The point where the line intersects the edge should be diametrically opposite the seam in the side of the container. Find the mid-point of the radius, and make another shallow punch mark. With the compass point in this mark, describe a circle 2 inches in diameter; and cut around it with tin snips, to form a 2-inch opening. In the center of the bottom, drill or punch a hole about 9/32 inch in diameter.

At a point in the lid about two-fifths the distance from the center to the edge, make a hole to receive the large end of the brass shell of a standard medium-screw lamp socket. Either a keyless or key-operated socket may be used, as desired. Solder the socket shell to the lid. This mounting is exactly like that used for the enlargers, and is described on page 120.

From ¼-inch pressed composition wood, cut a disk that will fit snugly inside the can. If the top edge of the can is rolled inward, the sides may be squeezed to permit the disk to be inserted. With the disk resting on the bottom, mark the positions of the 2-inch opening. The center of the disk, previously marked, should be exactly opposite the center hole in the bottom. Remove the disk and lay out two other 2-inch circles the same distance from the center as the first one, and 120 degrees each way from it. That is, the disk is marked for three 2-inch holes spaced equidistantly around a circle whose center is the same as that of the disk and whose diameter is half that of the disk.

There are several ways of cutting the 2-inch holes. You can use a jig saw, circle cutter of the type employed by radio set builders, or a lathe. But whatever the method, make the holes reasonably smooth and even. In the surface of the disk that is to be placed upward in the lamp housing, counterbore the holes to a depth of about ⅛ inch and a diameter of 2⅜ inches. This is easy to do with a circle cutter or lathe. Otherwise, you can cut the material away with a narrow chisel. This forms a recess in which the color filters rest; and while it is not absolutely necessary, it simplifies the matter of making the fit between filters and disk light-tight.

Obtain a piece of ¼-inch round rod about 1 inch long, and with a lathe or file reduce the diameter of one end to 3/16 inch for a distance of ⅜ inch. Thread the 3/16-inch portion to take a nut. In the center of the pressed composition disk, drill a 3/16-inch hole. Insert the threaded end of the rod from the bottom side, and run the nut down tightly. Thus the disk is clamped against the shoulder on the rod. When the disk is in

Fig. 70. Cementing safelight filters over openings cut in the rotating disk. Colored glass, gelatin, or paper can be used.

position, the rod projects through the center hole in the bottom, and a standard radio knob having a ¼-inch hole is fastened to it. When you turn the knob, the disk rotates, bringing the three openings successively in line with the hole in the bottom of the housing.

Standard circular safelight filters will fit the holes in the disk; or you can cut circles of colored glass, film, or even colored paper, and use them instead. A little glue or cement applied around the openings will hold the filters securely in position (Fig. 70). One opening can be left clear, to produce a white light for general inspection after negative or print has fixed sufficiently to prevent light damage. For use with negatives, one disk should be a green suitable for handling panchromatic film, or a red for orthochromatic film. For prints, use a clear yellow for contact printing papers, a bright orange or greenish yellow for fast enlarging papers. A photo-supply dealer can provide you with a list of the proper safelight filters.

Give the outside of the housing a coat or two of lacquer or enamel that will withstand moderate heat. The model

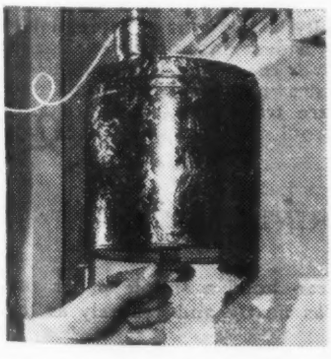


Fig. 71. A turn of the knob brings new filter in position.

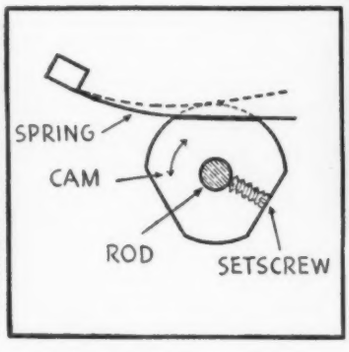



Fig. 72. Optional cam centers filters over hole in housing.

shown was finished with a black crystalline lacquer of a type normally sold by radio-supply houses (Fig. 71). Before painting the housing, determine the method to be used for fastening it to the darkroom wall or other surface. The safelight normally is mounted with the bottom opening away from the wall or other supporting surface. You can punch holes through the back of the housing near the top, for wood screws. Another way is to solder lugs to project about 1 inch beyond top and bottom, and drill them for screws.

Use a 10- or 15-watt lamp in the socket, and adjust the lid so it is above the filter opening. The bulb will be close to the lid, and this produces a rather narrow angle of light through the opening. By inserting one or more socket extensions between lamp and socket, you can lower the bulb position and widen the light angle; or you can mount the socket in a lower position. By rotating the lid so the lamp is toward the rear, you can throw the beam of light farther forward. Usually the safelight lamp is placed above a print developing tray or negative tank.

All you have to do to bring the proper filter over the opening is turn the knob one way or the other. Since it is a common practice for photographers to start development of fast films in total darkness and then switch on the safelight for inspection after development is well under way, it is a good idea to arrange the safelight lamp so you can determine, in the dark, when the proper filter is in position. A simple way of doing this is to use a pointer-type knob on the disk shaft, and adjust it so the point is opposite a drop of solder or other "bump" when the correct filter is in position. With your finger, you can feel when the pointer and bump are in line. You can, if you wish, install a bump for each filter position; soon you will learn where to move the pointer by feel, to obtain any color of light you want.

Another optional feature is an arrangement that automatically positions each filter exactly over the hole in the bottom of the housing. Make the knob shaft about ¼ inch longer than specified, and place over it, between the knob and the bottom, a three-sided cam that you can make easily from a disk of brass ¼ inch thick. Pressing against the cam is a flat spring that may be made from a piece of bronze weather stripping material. By turning the knob, you can feel when a flat side of the cam parallels the spring; and if the spring is strong enough, it will help move the disk into position (Fig. 72).

Because of the smallness of the bulb normally used and the ample volume of the housing, this safelight lamp will not heat up enough to require ventilating holes.

## WIND-TUNNEL FILM DRYER.

THE time required for a negative to dry can be reduced to a fraction of normal by placing the negative in a gentle or moderate current of air; and it can be cut still further by adding heat to the air. The object should not be to remove

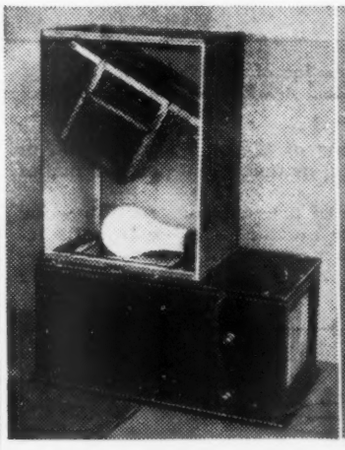


Fig. 73. Completed film dryer with the front panel removed.

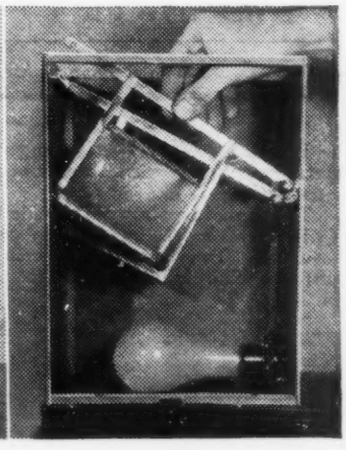


Fig. 74. Hangers are supported by trough-like metal strips.

every trace of moisture from the gelatin of the film, but only to reduce its moisture content to a point where it normally would go if allowed to dry naturally. An exception is provided by an extremely humid climate, as in the tropics, where forced drying may be necessary in order to remove any moisture at all.

An air current alone is sufficient for a majority of cases where rapid drying is desirable, particularly in winter when atmospheric moisture is low. When heat is desirable to offset a humid condition, it should be used sparingly, or emulsion damage may result.

The film dryer illustrated in Fig. 73 has, as its basis, a wind-tunnel arrangement for blowing air into the film housing. The box, made of ⅜-inch plywood, is built as shown in the dia-

gram, Fig. 75. It is 13½ inches long, 7¼ inches wide, and about 8 inches high—outside dimensions. The opening in the top of the box is about 5 x 7 inches.

A fan having a 6-inch blade and operating on 115 volts is suspended by coil springs inside the base. A curved sheet of metal or heavy cardboard directs the air current upward through the opening over which the film housing is built. The open end of the box is covered with a piece of wire screen, an attractive grill, or a louver arrangement consisting of wood or metal strips as in a venetian blind.

In one side of the box mount a toggle switch and wire it in series with the fan and an outlet into which a lamp cord can be plugged. The lamp, mounted in the housing above, warms the air from the tunnel, and operates together with the fan.

After the fan unit is completed, build a housing to enclose the films being dried. In the model shown, the housing was made primarily to handle 3¼ x 4¼-inch cut films in frame hangers (Fig. 74), the ends of the hanger bars engaging trough-shaped brackets made of tin-can material (Fig. 78), and running across the sides of the housing. A similar arrangement can be used for pack films held by clip hangers, but the bottoms of the films should be weighted to keep them from whipping around. By making the housing taller, or using a length of stovepipe, single lengths of roll film can be suspended over the air opening. Both ends of the film should be anchored to prevent whipping and curling.

For drying lengths of 35 millimeter film, the best arrangement is an open reel, of round or square cross-section, on which the film is wound. This reel is suspended in a vertical position over the opening. A rectangular reel can be made

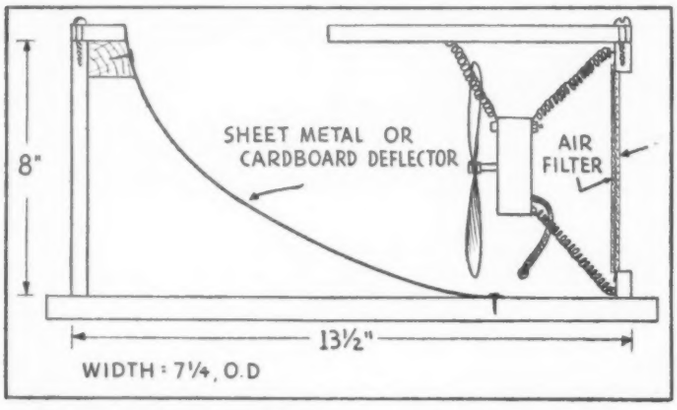



**Fig. 75. Diagram showing construction of the wind tunnel base. Dimensions can be changed to accommodate a fan of another size.**

by installing 6- or 7-inch lengths of ¼- or 5/16-inch wood or metal rod at the corners of wood or metal end pieces 5 inches square (Fig. 77).

The housing shown is made of pressed composition wood 5/32 inch thick. It has no top or bottom, and the front is removable. Two side pieces measuring 6¼ x 12 inches are required. The front and back panels each measure 8¾ x 12

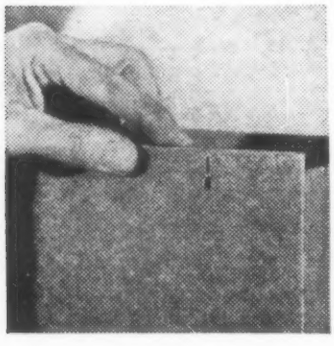


**Fig. 76. Brass escutcheon pins support front panel as shown.**

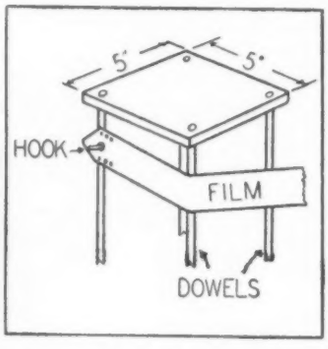



**Fig. 77. A small open reel is used for drying 35 mm roll film.**

inches, and overlap the edges of the sides. Two strips of wood 5/16 inch square reinforce the rear joints; and two pieces of the same material 8 7/16 inches long serve as braces across the top and bottom of the front opening. Screws running through the lower cross brace, plus two small L-shaped clips at the back, hold the housing to the wind tunnel top. The front panel can be hinged like a door, or provided with two slots terminating in holes and hung from two escutcheon pins or nails as shown (Fig. 76), the lower edge being retained by a strip of sheet metal bent to form a clip and fastened beneath the lower cross brace. The inside of the housing is varnished or lacquered to retard dust accumulation.

If you want to heat the current of air, an easy way of doing it is to mount a lamp socket on one of the side pieces, close

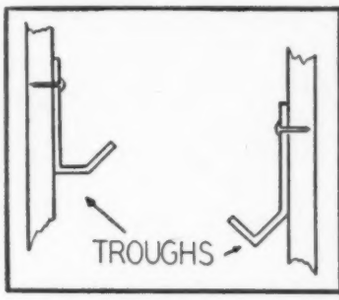



**Fig. 78. Cross-sections of the two trough-like metal supports.**

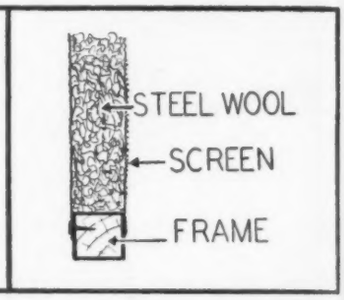



**Fig. 79. Construction of steel wool air filter for wind tunnel.**

to the bottom, in such a way that a 100-watt lamp placed in it will project over the air opening. The housing should be tall enough so the lamp is well below the bottom edge of the film, as a safety measure. The heat delivered by a 100-watt lamp is not great, but is enough for ordinary purposes. In a test, air emerging from the top of the housing had a temperature of 72 degrees Fahrenheit when the lamp was off. With the lamp burning, the temperature rose to 80 degrees.

A wire-wound heating element of the type used in reflector heaters would, of course, deliver much more heat; but its use in close proximity to wood and to the film is not advisable. An infrared drying lamp might be suitable for use with this arrangement, and would be better than a wire-wound unit. However, such lamps must be used with care so as not to cause excessive drying. A 100-watt lamp produces considerable infrared radiation, which no doubt has an appreciable action directly on the film it reaches, in addition to the heating effect of the lamp on air.

A short, flexible lamp cord runs from the socket and terminates in a plug that fits the outlet in the side of the wind-tunnel unit.

If used in a reasonably dust-free room, no air filter is generally necessary. However, the addition of a simple filter unit is worth the extra trouble. From wood strips about ½ inch square, make a frame to fit snugly inside the air-inlet opening, behind the fan. Tack a square of ordinary wire screen over one side of the frame. Fill the space in the frame with fine steel wool loosely packed and coated lightly with an oil such as SAE 20 automobile engine oil. The wool should not be dripping; one oiling usually lasts a year or more, unless you use the dryer constantly in a dusty atmosphere. Tack a second square of wire screen over the frame to complete the filter (Fig. 79). As the air is drawn through the oiled steel wool, dust particles and lint are trapped. Instead of steel wool, you can use some metal-wool scouring pads of the type employed in kitchens.

## EASILY-MADE PRINT TRIMMER.

IN LESS than an hour you can build a simple paper and print trimmer that will cut as neatly and squarely as the costliest manufactured kind.

The base is a piece of pressed wood (Masonite) ¼ to ½ inch thick, about 1 inch wider than the average width of paper you expect to cut, and 3 inches longer than the longest cut you will make. Thus a trimmer to handle up to 8 x 10 prints would have a base measuring 11 x 13 inches.

Cut two strips of the same material 1¼ inches wide and 1½ inches shorter than the width of the base. Mount one of these permanently, with glue and small nails, across one end of the base, the left end of the strip even with the left edge of the base (or vice versa if you are left-handed). Place the second strip in the same relative position at the other end of the base, but fasten it with two small bolts equipped with wing nuts and washers, and make slots in the strip so it can be moved endwise about ½ inch (Fig. 80).

Obtain a length of ¾-inch angle iron or a ¾ x ¾ inch piece of maple as long as the base, to serve as a straight edge. Place it on the base and move it against the ends of the strips. Move the adjustable strip until the straight-edge makes a perfect right angle (90 degrees) with the fixed cross piece. Clamp the wing nuts securely.

To trim a print squarely, lift the straight-edge piece and lay the print on the base, its edge against the fixed strip. Lower the straight-edge until it rests on the print and is tight against the ends of the cross strips. While holding it down tightly, draw a sharp knife along it, cutting the paper. And that's all there is to it! You soon learn to hold the straight-edge properly, and can make clean, straight cuts in the wink of an eye.

There are certain refinements you can add. A convenient handle, consisting of a block or knob of wood shaped so you can grasp it securely, can be mounted in the center of the straight-edge, keeping it to one side so the knife blade won't strike it. A hole drilled in one end of the straight-edge to fit loosely over a nail driven into the base will prevent the piece from moving beyond the ends of the cross strips. A cheap ruler mounted along the fixed strip will serve as a scale for measuring prints: a fraction of the first inch equal

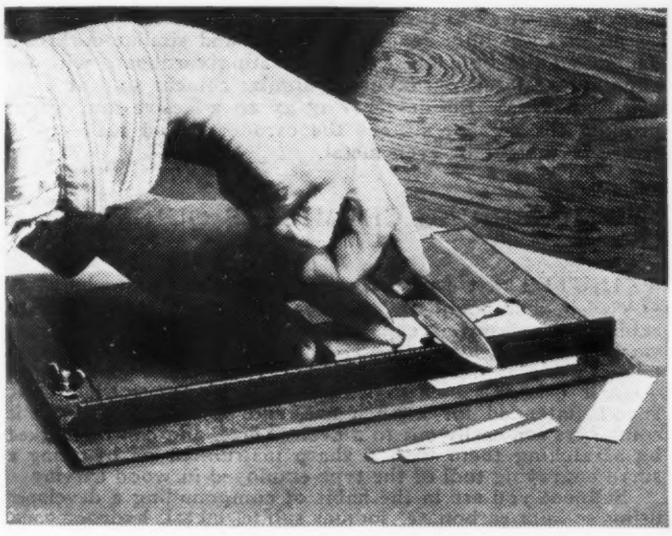


Fig. 80. This simple yet extremely efficient paper trimmer employs a length of angle iron as a guide bar for the knife.

to the width of the straight-edge bar must be cut away to make it read correctly.

The photograph shows a trimmer that has a length of angle iron as a guide bar for the knife. Notice that the bar is placed so the knife cannot run up over it and injure the fingers. It is important that the tip of the knife blade be kept keen, if good work is to be done. Old razor blades can be used if held in some kind of a handle, but they usually lose their edge quickly.

## WATER-POWER TANK AGITATOR.

THE simple agitator illustrated rocks a rollfilm developing tank at the rate of several changes of position a minute (Fig. 81). This is not a violent form of agitation, yet is sufficient to promote uniformity of development by causing the developer to move about in relation to the film.

The agitator employs a familiar "water-rocker" principle. The water container is divided in the middle by a partition, and while one half is being filled by a stream from a faucet, the other half empties. Shifting of the weight of the water causes the container to rock back and forth. The tank receptacle, being attached to it, rocks also.

The rocker or water container is fashioned from a small baking pan made of tinplate. The one illustrated measures 3⅞ x 7⅝ inches at the top and is 2¼ inches deep. It cost five cents. From tin-can material, cut a partition to divide the pan into two equal compartments. Make the partition high enough to extend about 1¼ inches above the top edge of the pan. Solder the partition in place, making sure that there are no places that water can leak around it. In each end of the pan, where the end joins the bottom, punch four or five holes about 3/32 inch in diameter (Fig. 82).

Obtain an empty tin can or bucket into which the developing tank can be slipped rather snugly. Trim the sides to a height somewhat less than that of the tank. From strips of tinplate 1¼ inches wide make two brackets to join the can to the pan. Solder these in place, and solder the upper edge of the can to the edge of the partition. Thus the pan and can

Fig. 81. Tank tilts back and forth about four times a minute.

Fig. 82. Holes are punched in each end of pan on bottom edge.

form one unit. Cut two L-shaped lugs, punch holes in them to receive a length of stiff wire or ⅛-inch brass rod, and solder one lug to the bottom of the pan and the other to the bottom of the can in such a way that the wire or rod, when passing through the holes, is in line with the partition and the center of the can (Fig. 83). The wire or rod should be about ½ inch from the pan and can bottoms, and parallel to them. Let the ends extend for about 1 inch beyond the lugs. This rod or wire forms the axis about which the arrangement tilts.

From redwood, cypress, or other water-resistant wood make a frame measuring about ¾ inches high, 6¼ inches wide, and about ⅛ inch longer than the distance between the two L-shaped lugs. The last two dimensions (width and length) are inside measure. Across the ends of the frame cut grooves ⅛ inch deep to act as bearings for the ends of the axis rod. Set the can and pan arrangement on the frame, with the rod

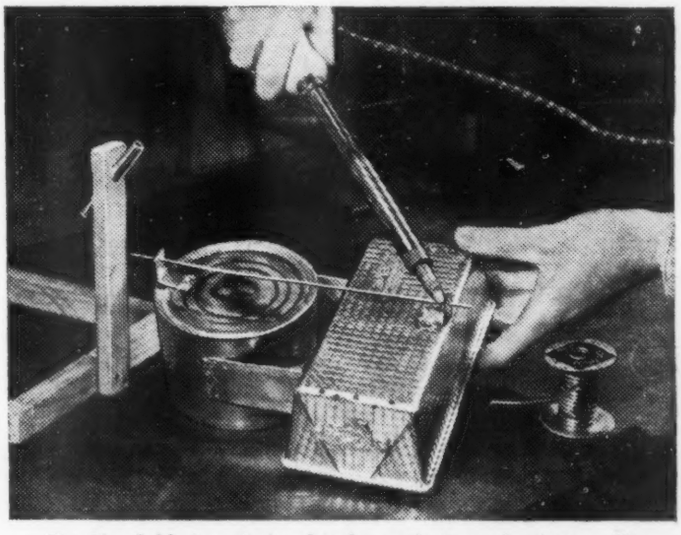


Fig. 83. Soldering pivot rod to lug on bottom of agitator. The rod rests in grooves cut into end pieces of the wooden frame.

in the bearing notches, and see that it tilts freely. The ends of the pan should move up and down about ¾ inch. Pads made of rubber or cork and fastened to the frame under the pan ends will cushion the tilting.

The water outlet can be a faucet that gives a steady stream and under which the agitator can be placed, or a length of copper tubing mounted on an upright fastened to the frame and connected by a hose to a faucet. Adjust it so that, when the pan is in a horizontal position, the stream is split by the partition. Give the metal parts, with the exception of the bearing surfaces of the axis, two coats of clear or colored lacquer or enamel. The frame need not be painted as it will

dry out between each use, and if made of redwood or cypress, will not rot. In fastening the wood parts together, use either non-rusting nails or waterproof plastic or casein glue.

Adjust the water stream so that each compartment of the pan will fill faster than it empties. The water discharging from the faucet or tube should be greater in volume than that running out through the holes in the pan ends, for a given time. Water will run out both ends of the pan with about equal velocity, but it runs into only one compartment at a time. The arrangement permits each compartment to fill fully while the other is emptying completely. It requires considerable force to tilt a tank filled with developer, and by providing for each water compartment to fill and empty completely, maximum tilting action is obtained without having to make the pan inconveniently long. By adjusting the sizes of the holes in the pan and the size of the water stream from the faucet, the frequency of tilting is controlled. About four tilts a minute will be found satisfactory.

The developing tank should not be so full that the solution runs out when it is tilted moderately. You may have to decrease the tilt by making the bumper pads thicker, to stop spilling. The tank should not slide about inside its holder. If it does, wedge it in position with strips of rubber, wood, or other material.

## MAKING OVERSIZE TRAYS.

BY BORROWING an idea from the canoe maker, the photographer can make large trays in which to process prints too big for the ones he already has. Such trays will withstand long service if handled with reasonable care. They should, preferably, be placed on a flat surface before filling, and then not moved until the water or chemical solution is removed by dipping or siphoning. To lift a tray much bigger than 16 x 20 inches, when it is half-full of water, puts a considerable strain on it.

These giant trays consist of wooden frames over which is stretched cloth that has been impregnated with varnish or other waterproof material. Make the frame of hardwood, such as oak, and take particular pains to produce strong corner

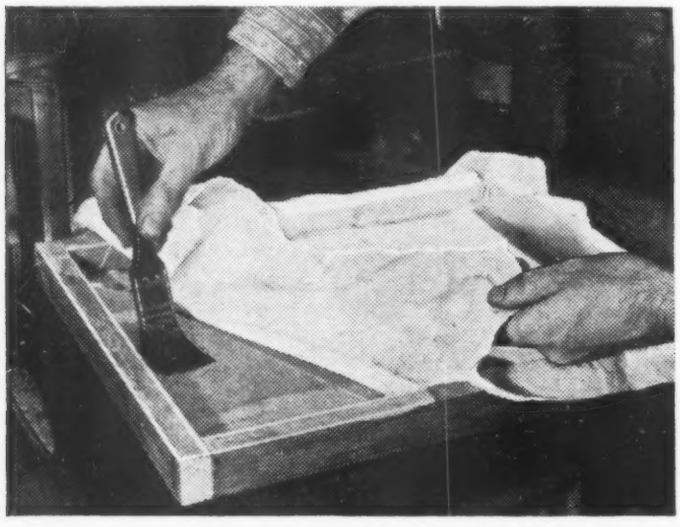


**Fig. 84. Coarse cloth is cemented to the wooden frame with waterproof glue. When dry, it is given two coats of varnish.**

joints. The size of the strips forming the frame may vary widely. For an 11 x 14 tray, ¾ x 1¾ inches would be about right. For larger trays, the depth can be increased somewhat by making the strips wider; but a ¾-inch thickness is enough. Rabbet the strips so that, when they are assembled, there will be a recess in the bottom of the frame to receive a sheet of stiff plywood or composition building board.

The corner joints can be simple butt joints reinforced by nails or wooden dowels. Use a good glue, preferably waterproof casein or plastic, on each joint. Also use glue to fasten the bottom panel in the rabbet. Round all exposed edges of the frame with a block plane, rasp, or edging tool.

Cut the cloth to a size that permits it to extend up over the edges of the tray and down the outside of the frame to the bottom. For smaller trays, you can use bed sheeting or similar material. For larger trays and prolonged service, a heavier cloth such as light canvas may be preferable. Give the bottom of the tray and the frame where the cloth is to extend a coat of casein glue or waterproof linoleum cement (Fig. 84). Then apply the cloth, and smooth it as neatly against the glue-coated surface as possible. There will be wrinkles at the corners; smooth them down as well as possible. The portion of the cloth extending beyond the top, inside edge of the frame can be slit with scissors wherever necessary to make it lie flat. The resulting seams should be carefully butted and well glued.

When the adhesive has dried, give the cloth two or more coats of a good spar varnish, lacquer, or a chemical-resisting asphalt paint. Aluminum paint can be used. Shellac is not as desirable as varnish because of its brittleness. The idea is to build up a uniform thickness of varnish or similar material that will resist water, the cloth acting mainly as a base and reinforcing medium. Apply the finish to the bottom of the tray, too.

In an emergency a large tray can be fashioned from four strips of lumber and a piece of oilcloth. The lumber is nailed together to form a frame of the size desired and placed on a table. The oilcloth, which must be considerably larger than the frame, is spread over it and pressed down into the frame to form a basin for the solution. Oilcloth is not desirable for a permanent tray as the folds will crack in time.

Small trays, film-developing tanks, and similar darkroom equipment can be made by impregnating cardboard with the aluminum-colored pyroxylin or similar cement sold at hardware counters. Besides serving as an adhesive and waterproofer, the cement stiffens the cardboard and makes it as strong as plastic or even metal.

## MEASURING CHEMICALS QUICKLY.

MINUTES that eventually merge into hours can be saved when compounding chemical solutions if marked or calibrated measuring cups are used in portioning out the various dry and liquid ingredients. Numerous kinds of containers made of plastic are available for making such measures —small drinking cups, cocktail tumblers, measuring cups, spoons intended for kitchen use, and so on. These plastic containers are easily cut to a desired size, and can be marked by scratching them with a sharp instrument or by using a small engraving tool of the type employed in wood carving.

Suppose you are in the habit of compounding a developer using sodium carbonate, sodium sulfite, metol, hydroquinone, and potassium bromide. Weigh out the exact quantities of each chemical, and select a plastic cup, spoon, or other container that will hold each portion. You probably won't find a measure that holds the quantity exactly; but by cutting a little off the top, or making an index mark on the inside to indicate the level to which it should be filled, you can easily "calibrate" it. Mark each measure plainly to indicate what chemical it is to hold. For the developer given as an example, you will have five of these.

On the darkroom wall, arrange a row of small hooks or nails and hang the measures on them in the order in which the chemicals are to be dissolved. Label the row with the name of the developer. You can label each hook, too, with the chemical its measure is to hold; but if the measure itself is marked, that is not a necessity. Mark the quantity of water opposite the name.

Now when you want to mix your pet formula, all you do is pour out the quantity of water indicated, take down the first measure, fill it to the top or index mark with the chemical indicated, and dump it into the water. Then, as each chemical dissolves, repeat the process for succeeding measures. It takes a surprisingly short time to mix developer or other solutions that way.

The layout for a typical developer might look something like this:

**D-72 DEVELOPER**

**Water 16 ounces**

**Metol Sodium Sulfite Hydroquinone Sodium Carbonate Potassium Bromide**

**Add water to make 32 ounces**

Each name in the above table represents a tagged measuring cup on a hook. You don't have to think about quantities, except in the case of the water.

The bromide measure, which will be comparatively small, can be a small metal cup such as that made from an empty rifle cartridge. A coat of lacquer will discourage corrosion. A handle can be made of wire and soldered to the cup.

## MASK CUTTER.

WHEN color transparencies made with a 35 millimeter miniature camera or similar small size are bound between 2 x 2-inch cover glasses for use in a projector, they are sandwiched first between paper masks. You can cut such masks easily with the aid of a simple metal pattern.

Obtain a flat piece of stiff sheet metal, such as sheet aluminum 3/64 inch thick, and cut a rectangle measuring exactly the same in width as the cover glasses you intend to

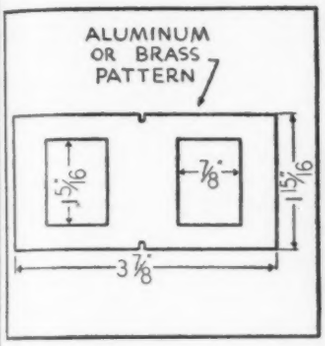



Fig. 85. Metal pattern used as a guide for cutting the masks.

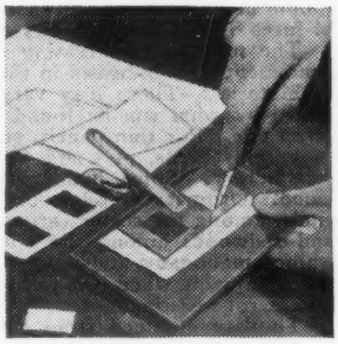


Fig. 86. Spring clamp holds the guide and paper firmly on board.

use, and twice as long. Cover glasses vary slightly, but for all-around use the pattern can measure a shade over 1 15/16 inches wide and 3 7/8 inches long. Make all corners square and the edges straight and smooth.

Cut two rectangular openings slightly smaller than the size of the picture area to be masked. For most miniature cameras, these will be 7/8 to 29/32 inch wide and 15/16 to 1 1/8 inches long, with the latter dimension parallel to the shorter edges of the pattern. Center the openings with respect to the longer edges, and with respect to a short edge and a line that divides the pattern into two squares. At the ends of this dividing line, make shallow notches with a saw or file. The openings in the pattern can be cut by drilling starting holes and cutting roughly to scribed lines with a jeweler's saw or other metal-cutting saw. Finish by filing carefully to the lines (Fig. 85).

To use the pattern, lay it on a piece of paper that in turn rests on a piece of pressed composition wood having a smooth surface. If the paper is square at a corner, adjust the pattern to coincide with the edges, and you will have two less cuts to make. Use a spring clamp or C-clamp to hold the pattern, paper, and cutting board firmly together. With the point of a sharp knife blade, cut all around the two openings and the outer edges, and make nicks in the mask at the two notches (Fig. 86). Unclamp the sandwich, and the mask is ready to use. Use the two nicks as guides in folding it. The pieces of film being mounted should be fastened to the masks with bits of gummed paper or tape, so they will not slip.

Any fairly heavy, light-colored paper will do for masks. Papers having a metallic surface are particularly attractive and reflect heat well. The secret of neat mask cutting is to have a keen knife blade. Keep a sharpening stone handy, and use it often.

## GENERAL INFORMATION.

THERE are tricks to every trade, and photo-gadget building gets more than its share because it touches upon several trades. A few hints about tools, materials, and some common operations will not be amiss here, and may save you considerable time.

**Gluing:** Several kinds of adhesives are found in most homes and shops today. One, liquid cabinetmaker's glue, is excellent for joining parts made of wood, cardboard, cloth, and leather, but it has one drawback; when the joint remains for a time in a moist atmosphere, the glue may soften, swell, and ooze out. Waterproof casein glue and the newer plastic resin adhesives hold just as well and are not affected by moisture. Casein glue, a powder, is mixed with cold water about 15 minutes before use. Plastic glue, also powdered, can be used immediately after mixing. Pyroxylin adhesives of the "household cement" type are easy to use, but being rather costly, are best suited for small gluing jobs or those requiring an adhesive that sets quickly. They are excellent for gluing leather, patching camera bellows, fastening leather to metal, and similar jobs.

**Soldering:** Soft solder is used to join various metals including iron, copper, tinplate, brass, and monel metal. A soldering iron and a suitable flux are usually required. For brass, a commercial paste flux is satisfactory. Rosin can be used if the brass is well-cleaned, and should always be the flux for electrical connections where later corrosion might cause trouble. Liquid fluxes are used on iron and steel. One type consists of a solution of hydrochloric acid in which equal parts by weight of zinc and sal ammoniac have been dissolved to saturation. Before using a new soldering iron, you must tin it. Let it heat until it will melt solder, place a little flux and some solder on a piece of wood, and rub the copper tip back and forth on the wood while the solder, aided by the flux, coats the metal. In soldering, apply the flux to the joint first. Tinned sheet iron requires no flux if it has a bright appearance. Most flux worries can be eliminated by using wire solder having either a rosin or an acid core.

**Hard soldering:** Silver solder makes a stronger joint than ordinary soft solder, but requires more heat. Usually a small torch is employed. Borax or some commercial preparation, either powdered or liquid, is used as a flux.

**Finishes:** There are countless ways of finishing wood and metal, so anything said here should be regarded merely as a suggestion. If you have a paint sprayer of some sort, you can apply quick-drying lacquers or the slower drying synthetic enamels to produce a practically faultless finish. Lacquer may be polished subsequently with a commercial rubbing compound, but synthetic enamel requires no after-treatment. When lacquer or enamel is to be applied to wood, first give the surface a coat of sealer recommended by the manufacturer. When the surface is metal, use an undercoater. The various brushing lacquers offer an easy way of producing attractive finishes. Such lacquer is merely brushed on evenly and allowed to dry. Often one coat is enough. Undercoaters, surfacers, primers, etc., usually are not required. From radio supply houses and some hardware stores, you can obtain crystalline lacquers. These smell like moth balls, and when they dry, a chemical ingredient causes the formation of a beautiful crystalline pattern. Such a lacquer was used on the enlarger exposure meter described on page 123. Black and dark red are serviceable colors in crystal lacquer. Wrinkle enamels that produce the attractive finishes so familiar on radio equipment, automobile accessories, typewriters, and manufactured photo equipment are obtainable, but they usually require careful baking in an oven to produce the wrinkling. Local companies doing such work will finish your home-built equipment for a small fee.

**Cutting metal:** Use a hack saw for cutting bars, rods, tubes, and heavy sheet metal. For thin material such as tubing, the blade should have about 24 teeth per inch; for heavier metal, 18 teeth. Small hack saws that take slender blades a few inches long are handy: many users prefer the blade inserted so it cuts on the pull stroke. For very fine work, a jeweler's saw frame, which looks like an ordinary hand scroll saw, equipped with a fairly fine jeweler's saw blade is one of the handiest of tools. The blade cuts on the pull stroke. Handled carefully, such a saw will eat through surprisingly heavy pieces of steel and brass. Little or no subsequent filing is required to produce a smooth finish.

**Draw filing:** To finish the edge of a piece of brass or other metal, lay a flat file across it at right angles and move the file back and forth parallel to the edge. This is called draw filing, and producers a smoother finish than the ordinary kind.

**Plating:** The application of a nickel or chromium finish to brass or steel is a job for a commercial plating plant.

**Working monel metal:** This is tough stuff. In moderate thicknesses, it can be cut with heavy tinner's snips; otherwise, use a hack saw or power-operated jig saw with metal-cutting blade. When drilling holes in monel, be careful not to burn the bit. Make a deep punch mark to start the drill, then lubricate the drill point with kerosene, turpentine, or a sulfurized cutting oil. Always use a slow drill speed.

### Tools for the Craftsman.

Amplifying the list mentioned in the Introduction, here are some suggestions for hand tools you will find useful in carrying out the various foregoing projects.

**Screwdrivers**—Three or four having blades of various thicknesses and widths ranging from about 3/32 to 1/4 inch. Those fitted with screw-gripping attachments are handy. Blades made of an alloy steel will give better service than ordinary steels.

**Hammers**—A medium or light claw hammer, for driving nails. A moderately heavy machinist's hammer and a very light one (2- or 3-ounce), for all-around working of metal.

**Pliers**—Slender-nose type for holding nails, making loops in wire, reaching difficult places. Claw-type pincers. Wire-cutting pliers of some kind.

**Saws**—Hack and jeweler's saws as described. Hand cross-cut and hand rip saw, for wood.

**Chisels**—Wood chisels having blades ⅛, ¼, ½, and 1 inch wide will cover most jobs. A small cold chisel having a blade ¼ to ½ inch wide will be found handy at times.

**Punches**—A sharp-pointed punch, which can be an old nail set with the end ground to a point.

**Tinner's snips**—A medium-sized pair, say about 12 inches in over-all length.

**Files**—6- and 10-inch flat files for metal. Triangular files of various sizes, for metal. Round file about 3/16 inch maximum diameter (often called a rat-tail file). Half-round wood rasp 10 or 12 inches long with medium teeth.

**Planes**—Block plane for working end grain and rounding edges. Smoothing plane about 2½ inches wide and 14 inches long.

**Wrench**—Small adjustable wrench for use on bolts and nuts.

**Drill**—A push-type drill with an assortment of straight-flute bits will do for wood and plastic materials. For metal, a small hand drill and assortment of spiral-fluted bits up to ¼ inch in diameter. For wood boring, a brace and wood bits; metal drills are available to fit braces.

**Thread cutters**—Inexpensive taps and dies, with suitable holders, are available. You can get along with a ¼-20 U. S. Standard tap and die to match, and a 6-32 machine screw tap and die. For the ¼-inch tap, use a No. 7 drill to make the hole; for a 6-32 tap, a No. 35 drill. Tripod screws (American) have ¼-20 threads.

**Power tools**—If you have access to a drill press, circular saw, band or jig saw, and other power tools, you will be able to perform, with greater speed and accuracy, most of the hand tool operations. But you still will need such essential hand tools as screwdrivers, hammers, and files. When buying a tool remember that the cheapest is not always the best, and that a good tool gives long service.

**Electric wiring**—No. 14 solid copper wire is the common size used in older house wiring, but No. 12 wire, being heavier, is preferable because it will carry heavier currents without overheating, and causes less voltage drop in long runs. For light-duty service such as the enlarger exposure meter, ordinary silk-covered lamp cord will do. But for floodlights, spotlights, and other equipment that will experience some rough handling, a heavy flexible cable of the extension-cord type is essential. The plugs and sockets should be of rugged make and securely connected to the wires. Plugs made of soft materials are more resistant to abuse than those of brittle plastic.

The sizes of wires have a relation to the sizes of the lamps and other equipment they serve; and the fuses or circuit breakers used to protect those wires should have a current-carrying capacity low enough to prevent dangerous overheating of wires. Ordinary lamps, projection lamps, fluorescent units, and most other electrical equipment are marked to show their wattage (volts multiplied by amperes). But floodlamps are not so marked. The various standard floods draw approximately the following:

No. 1—250 watts
No. 2 and R2—500 watts
No. 4—1,000 watts

Some approximate maximum carrying capacities of various wires, in terms of wattage at 120 volts, are:

No. 18 flexible cord—600 watts
No. 16 flexible cord—800 watts
No. 14 rubber-insulated—1800 watts
No. 12 rubber-insulated—2400 watts

**Fuses** for a main house-lighting circuit running into the meter generally should be 30-ampere, while those in branch circuits should be 15-ampere. When more than 15 amperes, which would allow 1800 watts on a 120-volt line, are to be handled, a line heavy enough to permit larger fuses should be installed. A 15-ampere fuse will handle three No. 2 floods or six No. 1 floods. In older homes and apartments the wiring should be checked by a licensed electrician before installation of fuses of a greater capacity than found in the fuse box.

The matter of increasing safety by grounding electrical equipment was discussed in the Introduction.

**Materials**—These may vary widely, and often are determined by what can be found in the household junk box or scrap pile. For thin panels, such as those suitable for boxes of various kinds, plywood ¼ or ⅜ inch thick generally is satisfactory. Some builders prefer a pressed composition wood. Ordinary woods most suited to gadget building include, among the softer varieties, pine, cypress, poplar, cedar, and redwood; among the harder types, birch, maple, oak, walnut, mahogany, and cherry. Redwood is soft and splintery, but is valuable when it is to be subjected to wetting. Cypress also is rot-resisting.

Tinplate obtained from empty cans is one of the most versatile of materials available to the photo-gadgeteer. It costs practically nothing, and it is easy to solder, punch, bend, paint, and otherwise work. Use sharp tinner's snips to cut it, and smooth the edges with abrasive cloth. Watch out for the needle-sharp slivers that sometimes are produced in cutting. Sheet brass in various thicknesses from 0.005 inch to 3/16 inch or so is one of the most useful materials; and brass rods, either round, square, or hexagonal, can be employed in innumerable ways. For tripod screws, use ¼-inch brass round stock, and cut the threads with a ¼-20 die. Heads for these screws can be machined from ¾- or 1-inch brass rod.

Most of the assembling of parts can be accomplished with a few sizes of bolts and screws. Your assortment should include various lengths of 6-32 bolts, either brass or nickeled, with hexagonal nuts to fit; some 8-32 bolts and nuts; ¼-20 bolts and nuts for use where considerable strength is required; and some small brass or plated-steel wood screws, both flat- and round-head. A few wing nuts to fit the ¼-inch bolts will come in handy.

Other useful odds and ends include metal angle brackets and strips commonly sold for repairing and bracing furniture; small furniture slides for use on bottoms of printers and other equipment, to prevent marring of surfaces; rubber-headed or felt-headed screws or nails for similar use and for the ends of tripod legs; discarded radio knobs or those intended for use on automobile gear shifts and cabinet doors; small brass escutcheon pins from which excellent rivets can be made; and slender wire nails ranging from ¼ to 1 inch in length.

The confirmed gadget builder soon learns one rule: never throw anything away! Although his shop may look like a junk-collector's nightmare, he at least is sure of finding just the piece he wants if he looks long enough. One old radio receiver properly disassembled and the parts filed in glass jars or boxes will furnish material for a surprising number of photographic gadgets. The same applies to almost any other piece of old equipment from which bolts, screws, and other small parts can be salvaged.


# Need New Photo Equipment?

You can make *it yourself* with the expert guidance of Walter E. Burton. Mr. Burton is now lining up many additional useful gadgets for inclusion in the forthcoming book, "Home-Built Photo Equipment." This book will contain all the equipment in the preceding book-length feature plus added chapters. More items you can build, more illustrations, more construction methods, more really *usable* suggestions for you will appear in the sturdy, long-lasting library form of "Home-Built Photo Equipment," Volume 31 in your Little Technical Library PHOTOGRAPHIC SERIES.


PRINTED IN U.S.A.

# *Wollensak means Good Lenses*

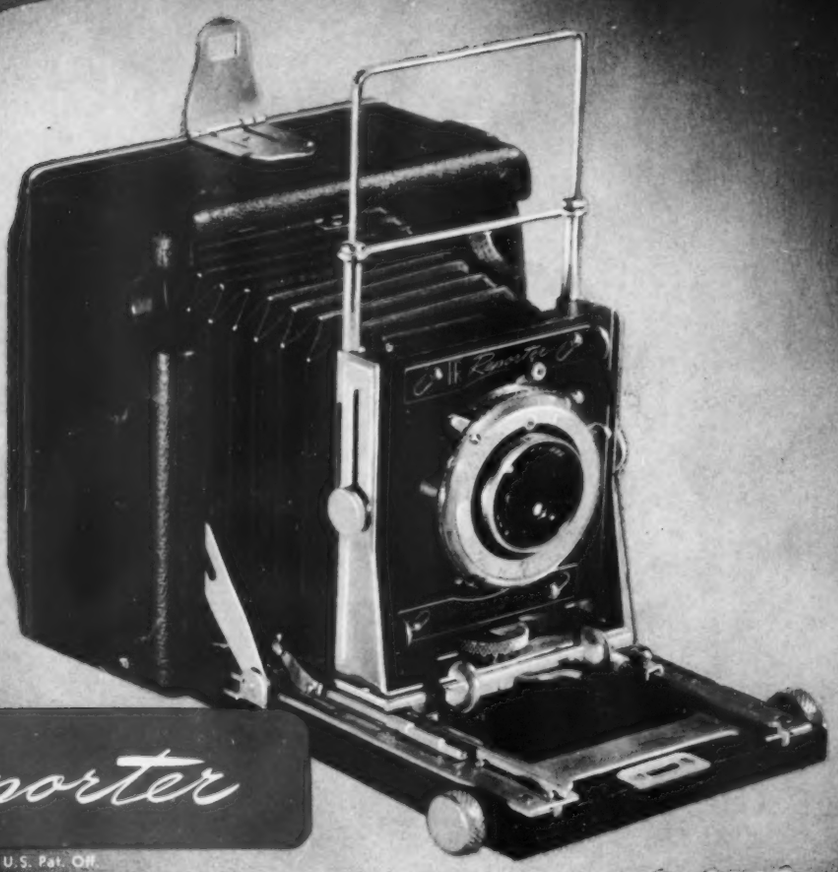
"BALANCE," by Ray Johnson of Providence, Rhode Island. Taken at night with flash bulb, this remarkable photograph has won many enviable awards for its dramatic portrayal of action at the circus. Doesn't it exhibit detail you'd like in your own enlargements?

Ray Johnson writes, "For many years I have been using Wollensak lenses with excellent results. 'Balance,' like all of my enlargements, was made with a 3½" *f*4.5 Wollensak Enlarging Velostigmat." Improve *your* photography with a Wollensak.

For Movies, Candid, Enlarging, Action, Stills

**WOLLENSAK OPTICAL CO., ROCHESTER, N.Y.**

# VERSATILE



## FR Reporter

T.M. Reg. U.S. Pat. Off.

## FOR 2¼ X 3¼ CUT FILMS and FILM PACKS

Here it is — the fine American made camera you've always wanted. Designed to meet your requirements for "all around" picture-taking (children — scenic — portraiture — sports) it represents, in its easy-to-handle, efficient operation, the *ideal* camera. Sturdily constructed to withstand a lifetime of *dependable* service its many distinctive features make it one of the nation's outstanding camera values. Your assurance that you must be satisfied is the F-R money-back guarantee. Look for F-R's "little man", representative of photography's finest.

REF. STOCK

**$56.00**

**WITHOUT LENS**

***Consult your photographic dealer for the lens or lenses best suited to your purposes.***

***KALART SYNCHRONIZED RANGE FINDERS are available for use with the F-R REPORTER.***

**Colorful, illustrated booklet yours on request. Write to Dept. B, Fink-Roselieve Co., Inc., 109 West 64th Street, New York City.**

**Fink Roselieve COMPANY, Inc.**

NEW YORK: 109 West 64th Street • CHICAGO: Merchandise Mart • LOS ANGELES: 1039 So. Olive Street